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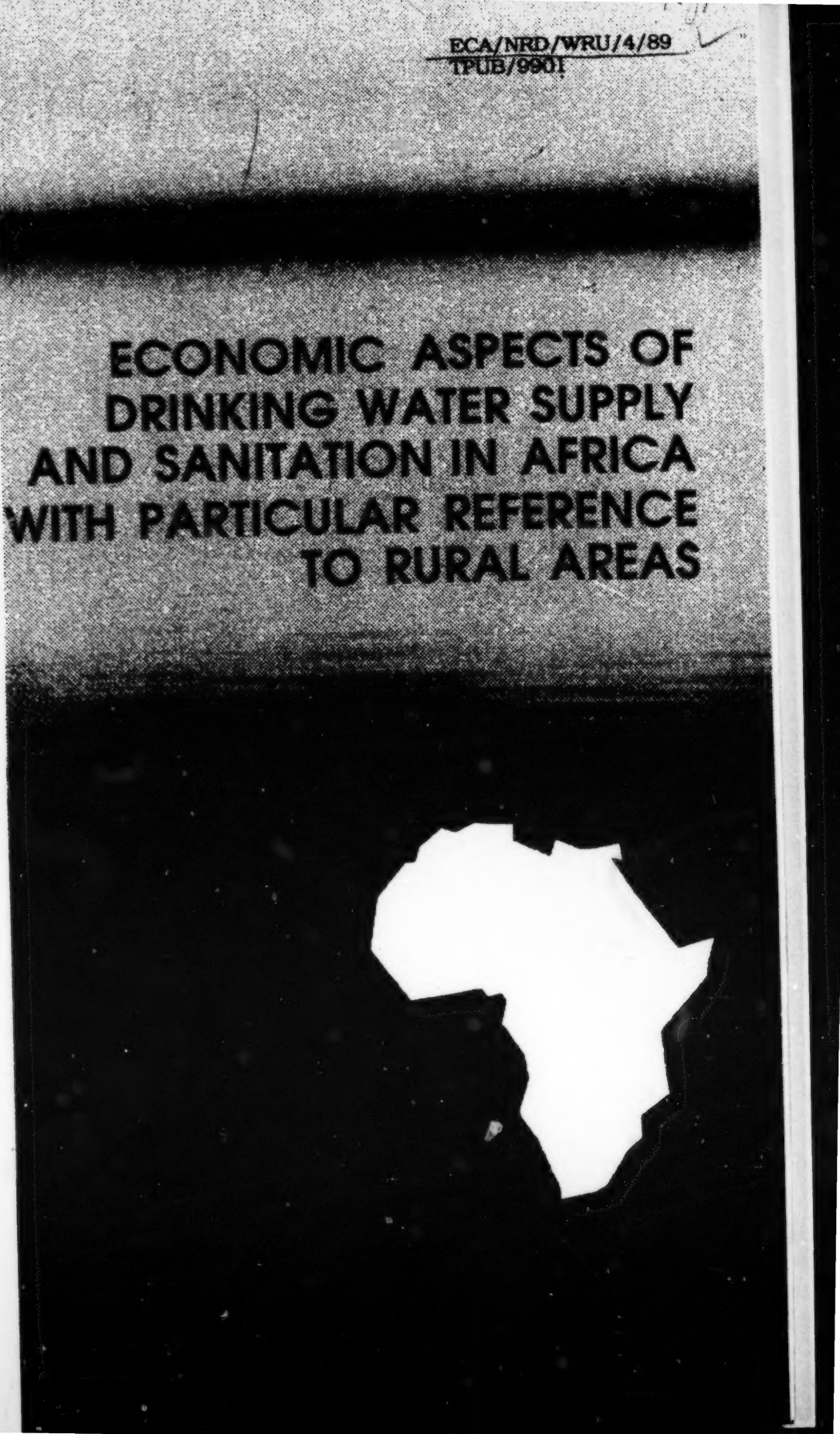
# ECONOMIC ASPECTS OF DRINKING WATER SUPPLY AND SANITATION IN AFRICA WITH PARTICULAR REFERENCE TO RURAL AREAS



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UNITED NATIONS
Economic Commission
for Africa
December 1989

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# INTRODUCTION

1. In November 1980, the United Nations General Assembly launched the International Drinking Water Supply and Sanitation Decade (IDWSSD) (1981-1990). Its purpose was to ensure that Governments adopted and implemented programmes to ensure that by the end of 1990 all peoples in the world would have access to safe and adequate drinking water supply and sanitary excreta and household waste disposal facilities.

2. The Lagos Plan of Action which is aimed at the economic development of Africa over the period 1980-2000, endorsed the objectives of the IDWSSD and specifically recommended to African Governments that in the formulation of national water plans, the plans concerning water supply should represent among other things national aspirations for the International Drinking Water Supply and Sanitation Decade.

3. The decade is almost at an end and from evaluations conducted by various bodies it has been concluded that though some progress has been achieved in the African region the achievements have fallen short of targets and there is a considerable amount of unfinished business to be attended to particularly in the rural areas. This is a matter of utmost concern to the region, which is plagued by low productivity among the working force, in almost all sectors of the economy. In view of the contribution which good drinking water and sanitary disposal of excrete and household wastes can make to productivity and the quality of life, this paper examines the economic issues that have constrained progress during the decade with a view to proposing policies and strategies for the 1990s that can contribute to overcome these constraints.

4. The first and second parts present the socio-economic background of the region at the start of the decade, and the plans drawn up by the countries to achieve its objectives. The third part assesses the implementation rates in terms of populations to be covered annually and the corresponding investment requirements to achieve the decade objectives by 1990 or 2000. In the fourth part the actual performance over the period 1981-1988 is presented and is compared with the required implementation rates to achieve the objectives. The issues that have constrained progress in the rural areas in particular are analysed in the fifth part. The conclusions drawn and the appropriate recommended actions to improve performance in the rural areas in the 1990s are presented in the sixth and seventh parts.

5. It is instructive to have a look at the socio-economic situation in the African region at the time the Decade started because the IDWSSD was seen as one of the instruments by which the social and economic conditions of the people could be improved.

## A. Population size and growth rate

6. At the time the decade was launched in 1980 the total African population was 452 million. Of this population 74% was rural and 26% was urban. The population grew at the fast rate of 3.2% per annum over the period 1975-80. This rate was fairly uniform over the subregions of the continent except in the countries of the North Africa subregion where it was 3.0% (Table 1).

**Table 1:** Total Population and Rate of Growth

| | size in million | | | average annual growth % | | |
|---|---|---|---|---|---|---|
| | 1980 | 1985 | 1987 | 1975-80 | 1980-85 | 1985-90 |
| Africa | 452 | 525 | 557 | 3.2 | 3.0 | 3.1 |
| North Africa | 109 | 125 | 132 | 3.0 | 2.8 | 2.6 |
| West " | 144 | 169 | 180 | 3.2 | 3.2 | 3.4 |
| Central " | 55 | 63 | 67 | 3.2 | 2.8 | 2.9 |
| East+Southern | 143 | 167 | 178 | 3.2 | 3.1 | 3.2 |

Source: UN ECA - Survey of Economic and Social Condition in Africa (1986-87)

**Table 2:** Rural and Urban Population as % of Total Population

| | 1981 | | 1982 | | 1985 | | 1987 | |
|---|---|---|---|---|---|---|---|---|
| | Rural | Urban | Rural | Urban | Rural | Urban | Rural | Urban |
| Africa | 74.5 | 25.5 | 73.5 | 26.5 | 72.2 | 27.8 | 71.8 | 29.2 |
| Northern | 59.7 | 40.3 | 59.0 | 41.0 | 57.8 | 42.2 | 56.8 | 43.2 |
| Western | 77.3 | 22.7 | 76.7 | 23.3 | 75.2 | 24.8 | 74.0 | 26.0 |
| Central | 72.3 | 27.7 | 69.8 | 30.2 | 68.6 | 31.4 | 66.2 | 33.8 |
| East South | 83.2 | 16.8 | 82.5 | 17.5 | 81.5 | 19.5 | 79.5 | 20.5 |

Source: UNECA: Survey of Economic Social Condition in Africa (1985-86 & 1986-87)

## B. Water supply and sanitation coverage

7. In a survey carried out by the WHO at the beginning of the decade to determine the numbers of people in various regions that had access to safe and adequate drinking water supply and sanitary excrete and household waste disposal facilities the total population in 1980 was estimated at 469 million. The sizes of the rural and urban populations were estimated to be 334 and 135 million respectively. The survey found that while only 73 million or 22% of the rural population had access to good drinking water, 89 million or 66% of the urban population were served with this facility. In the area of sanitary disposal of wastes while only 67 million or 20% of the rural population had access to this facility, 54% of the urban population were served.

8. In urban areas supplied with water, house connections varied from 7.2% in Burkina Faso to as high as 80% in Egypt for those supplied. Public standpost supplies ranged from 2.3% in the Madagascar to 59% in Botswana. Rural water supply was predominantly by standpost. In the area of sanitation, on-site disposal varied from 91% for the Seychelles to 5% in Burkina Faso for those who had access to this facility in the urban areas. In the rural areas on-site disposal predominated.

9. The levels of service also varied considerably over the region. In the urban areas it ranged from as low as 15 liters per head per day in Angola to 100 to 270 liters per head per day in Madagascar. In the rural areas it was generally between 20 to 40 liters per head per day.

## C. Tarrif and cost Recovery Policies

10. An analysis of the tarrif policies at the beginning of the Decade of 31 countries which provided information on this subject showed that 28 of them had one tarrif policy or the other covering either urban or rural areas or both. For the urban areas there were 5 or 18% of the countries which had policies aimed at full cost recovery. Another 21 or 75% had tarrifs which covered costs partially and a further 2 or 7% did not impose any tarrif at all. This meant that in 82% of the countries urban water systems relied on central government to subsidize their operation and maintenance costs. For the rural areas there was no country at the time with a tarrif policy aimed at full cost recovery. There were 10 or 36% of the countries where no tarrifs were charged at all, with another 13 or 46% where tarrifs were charged but they covered only part of the cost of operation and maintenance. The implication is that at the beginning of the decade almost all the rural water supplies depended on central government revenue for varying degrees of subsidy to meet their operation and maintenance costs.

11. What was again evident at the time was that all the countries that depended upon subsidies complained that the subsidies were inadequate to cover operation and maintenance costs and that there was need for upward revision of the tarrifs in the face of mounting costs of producing and delivering water. It was also evident that the tarrifs being charged were not clear as to what costs they covered - be they investment, operation and maintenance, system expansion, plant renewals or various combinations of these.

## D. Socio-economic indicators

12. At the start of the decade water borne and water related or associated diseases like bilharzia, cholera, schistosomiasis dysentery, diarrhoea, malaria, guiene worm accounted for about 80% of the illnesses in the region.

13. The infant mortality rate per 1000 births was 122 for the region. The highest was 131 in the West African subregion and the lowest was 114 in the North African subregion. The life expectancy at birth in 1980 for the whole of the African region was 48 years. This ranged from 53 years for countries of the North African subregion to 44 years for countries in the central African subregion as shown in Table 3.

**Table 3: Socio-economic indicators (1981-85)**

| | Area km$_3$ x10 | Population 1981 x10$^6$ | GDP/Capital US Dollars 1981 | 1985 | GDP Average annual growth rate % 1981 | 1985 | Infant Mortality Rate 1981 | 1986 | Life expectancy at birt 1980 | 198 |
|---|---|---|---|---|---|---|---|---|---|---|
| AFRICA | 27406 | 451.9 | 683 | 642 | | -2.6 | 122 | 102 | 48.1 | 50. |
| Northern | 8259 | 112.2 | 1153 | 1425 | | -0.6 | 144 | 89 | 53.4 | 57 |
| Western | 6.43 | 145.8 | 724 | 551 | | -5.7 | 131 | 115 | 46.3 | 47 |
| Central | 5421 | 63.8 | 418 | 337 | | 1.1 | 120 | 106 | 44.5 | 49 |
| Eastern and Southern | 7584 | 130.8 | 364 | 258 | | -0.7 | 126 | 97 | 47.3 | 47 |

Source: UNECA Survey of Economic Social conditions in Africa (1981-82 & 1985-86 & 1986-87).

14. The Gross Domestic Product (GDP) per capita in 1980 was US$ 683 for the region. Subregional variations ranged from US$ 1153 for North Africa to US$ 364 Eastern and Southern Africa. The annual growth rate of GDP for the African region was -7.9% over the 1980-81 year as shown in Table 4. It was highest in the Central African subregion with 3.9% and lowest in the North African subregion with -8.4%

15. In 1981 about 71% of the economically active population was engaged in agriculture, while the sector contributed only 22% of the GDP. (Tables 5 and 6). The percentage of sector investment to total investment assessed in 26 countries over the decade 1971 to 1980 ranged from 1.0 to 10.0 with an average of about 4.7 1/. This is considered to be on the low side.

16. In the preparation for the Decade the African countries prepared country papers first for a regional meeting in Addis Ababa in August 1980, which outlined their problems and needs in water supply and sanitation 2/. They also prepared contributions for the launching of the Decade in New York in November 1980. In addition, the WHO carried out a rapid assessment of the state of preparedness of the ECA member States. For the regional meeting the member States reported among other things on the positions in their countries with regard to drinking water supply and sanitation coverages in urban and rural areas in 1980, targets and objectives expected to be achieved by 1990, manpower and training needs, investment needs and institutional arrangements.

## A. Population targets to be covered

17. From a synthesis of the information provided it was estimated that the population of the African region was expected to increase by 159 million over the decade 1981 to 1990. This was expected to be made up of 68 million people in the rural areas and 91 million in the urban areas. If these figures were added to the population which had not been covered at the beginning of the decade and if 100% coverages were to be achieved by 1990, then 137 million people in the urban areas and 329 million in the rural areas would have to be provided with good drinking water, and in the case of sanitation 153 and 335 million people will have to be provided in the urban and rural areas respectively.

18. The populations targeted to be covered with drinking water are shown in figs 1 and 2. It is evident from the figures that most countries targeted to achieve 100% coverage by 1990. In the case of urban supplies only Chad, Lesotho and Madagascar aimed at less than 100% coverage. On the other hand for rural water supplies only Cape Verde, Chad, Egypt, Ghana, Liberia and Ethiopia were content with less than full coverage.

19. In the field of sanitation the countries which reported on it were less clear with their targets as they had been with drinking water supply. Most of them only indicated the number of latrines they would provide during the decade.

**Table 4: Annual growth rates of GDP per capita**
(At constant 1980 factor cost)

| | 1980-81 | 1981-82 | 1982-83 | 1983-84 | 1984-85 | 1985-86 |
|---|---|---|---|---|---|---|
| AFRICA | -7.9 | 0.48 | -3.36 | -3.31 | -0.34 | -2.23 |
| Northern | -8.4 | 5.42 | 1.68 | -2.02 | 0.19 | 0.84 |
| Western | -11.4 | -3.44 | -9.35 | -6.11 | -0.46 | -6.38 |
| Central | 3.9 | -0.27 | 0.00 | 1.60 | -0.26 | -1.84 |
| Eastern & Southern | 0.4 | -1.59 | -2.43 | -2.08 | -1.27 | -0.86 |

Source: UNECA Survey of Economic and Social conditions in Africa (1985-86 & 1986-87)

**Table 5: Sectoral distribution of economically active population** (per cent)

| | AGRICULTURE | | INDUSTRY | | SERVICES | |
|---|---|---|---|---|---|---|
| | 1981 | 1986 | 1981 | 1986 | 1981 | 1986 |
| AFRICA | 70.65 | 68.25 | 11.35 | 11.75 | 18.00 | 20.00 |
| Northern | 46.75 | 42.50 | 21.45 | 22.65 | 31.80 | 34.85 |
| Western | 69.85 | 68.80 | 11.70 | 10.95 | 18.45 | 20.25 |
| Central | 75.90 | 73.15 | 9.20 | 10.40 | 14.90 | 16.45 |
| Eastern and Southern | 80.45 | 78.10 | 7.20 | 7.90 | 12.35 | 14.00 |

Source: UNECA Survey of Economic and Social conditions in Africa. (1985-86 and 1986-87)

**Table 6: Structure of GDP by main sectors in per cent** (at current factor cost)

AGRICULTURE

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|
| AFRICA | 22.30 | 22.19 | 22.78 | 22.67 | 22.79 | 24.00 |
| Northern | 13.51 | 12.17 | 11.74 | 12.01 | 11.96 | 13.15 |
| Western | 25.95 | 26.70 | 29.84 | 29.69 | 30.53 | 33.09 |
| Central | 28.36 | 29.78 | 27.72 | 25.13 | 26.15 | 28.13 |
| Eastern and Southern | 35.38 | 36.22 | 36.67 | 37.24 | 37.77 | 37.29 |

INDUSTRY

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|
| AFRICA | 39.00 | 39.28 | 37.90 | 37.22 | 37.41 | 35.86 |
| Northern | 48.48 | 50.05 | 49.50 | 47.77 | 47.88 | 45.01 |
| Western | 35.36 | 34.43 | 29.84 | 29.17 | 29.09 | 28.24 |
| Central | 32.73 | 32.43 | 35.23 | 39.65 | 37.63 | 32.35 |
| Eastern and Southern | 23.63 | 23.61 | 23.76 | 23.22 | 23.21 | 23.21 |

SERVICES

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|
| AFRICA | 38.70 | 38.54 | 39.32 | 40.11 | 39.80 | 40.33 |
| Northern | 38.00 | 37.28 | 38.77 | 40.22 | 40.16 | 41.84 |
| Western | 38.68 | 38.87 | 40.32 | 41.14 | 40.38 | 38.67 |
| Central | 38.41 | 37.80 | 37.05 | 35.22 | 36.21 | 39.52 |
| Eastern and Southern | 40.99 | 40.17 | 39.56 | 39.55 | 39.02 | 39.50 |

Source: Un ECA: Survey of Economic and Social Conditions in Africa, 1986-1987

## B. Levels of Service

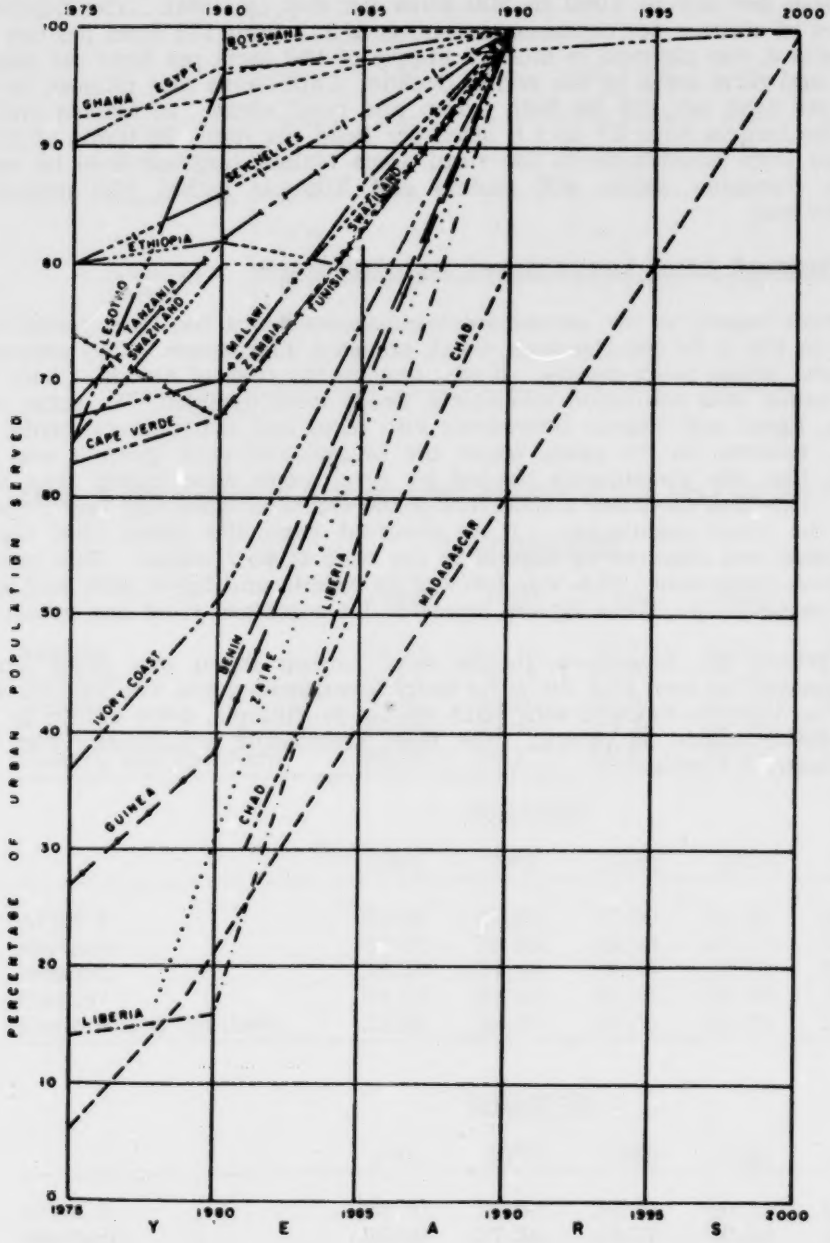
20. The planned targets for levels of service varied widely among the countries. For urban water supply Egypt planned to increase the per capita consumption of 100 litres per day in 1980 to 300 litres per day by 1990. The Seychelles also planned to attain a per capita consumption of 211 from 135 litres per day by 1990. In Algeria it was planned to attain a supply of 150 liters per head per day for both urban and rural areas by the end of Decade. Cape Verde also planned to attain 47 litres per head per day for both urban and rural areas. In Malawi and Burkina Faso the targets were 27 and 5 litres per head per day. In terms of distance of supplies from households in the rural areas Malawi targeted it to be within 500 meters, Tanzania within 400 meters and Ethiopia within 200 meters by the decade's end.

## C. Planned total investment requirements

21. With regard to the investment requirements over the plan period these are shown in Fig. 3 for the countries which provided information. They covered mainly rural and urban water supply. It was only in the case of Algeria, Chad, Tanzania and Zambia that sanitation investment needs were included. In some cases like Algeria, Egypt and Nigeria breakdown into rural and urban investments were not given. However in the cases where the breakdowns were given it was generally evident that the investments needed for rural water were higher than for urban water. This was no doubt a reflection of the extent of work that had to be done to cover the rural population. It is observed from the figure that the highest investment was required by Algeria to the tune of $5.7 billion. This included the sanitation component. This was followed by Nigeria and Egypt with $4.6 and $2.29 billion respectively. These figures represent the combined rural and urban needs.

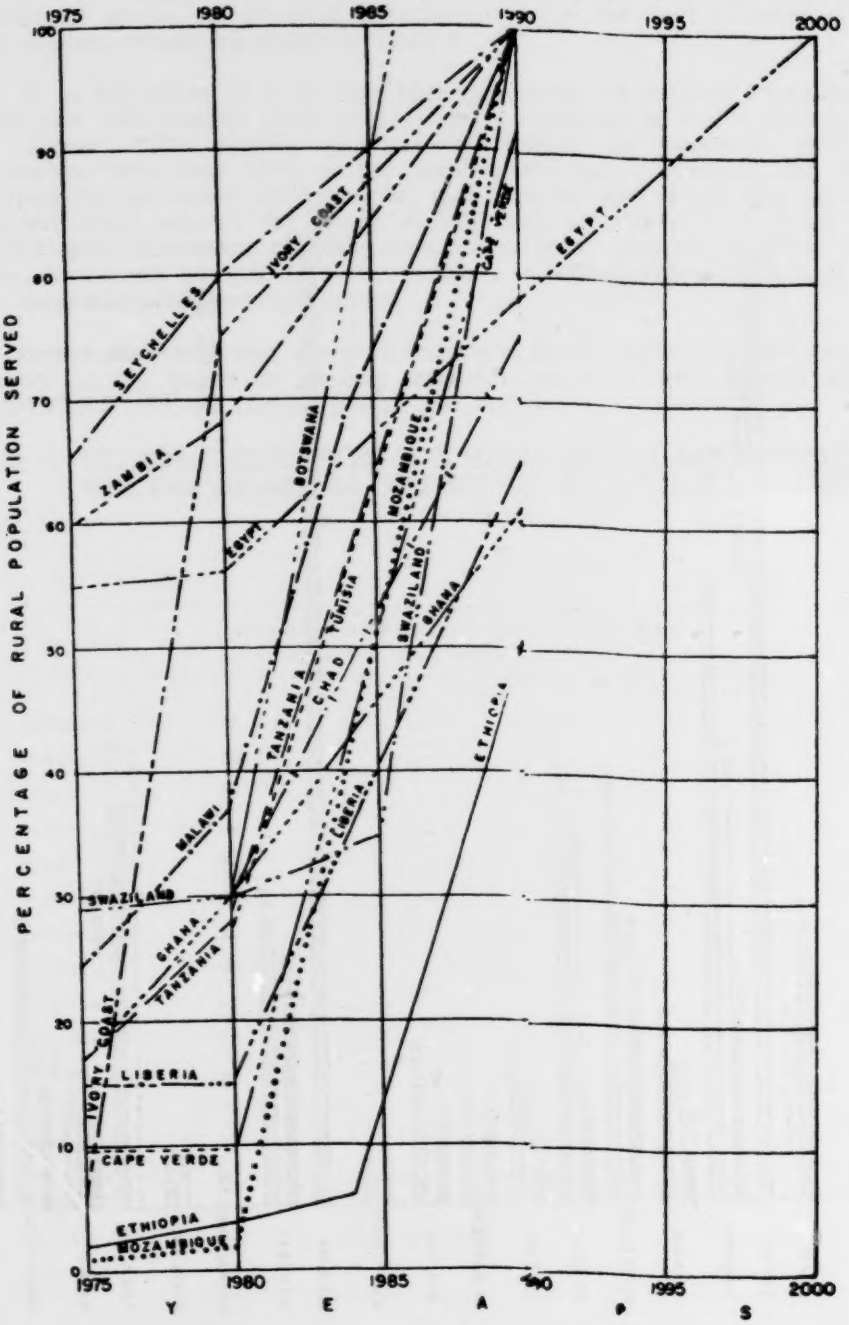
22. Where the investment needs were broken down into rural and urban components it is seen that the rural water investment needs was highest with $642 million in Uganda, followed with $615 million in Ethiopia, $604 million in Tanzania and $499.0 million in Kenya. The least investment requirement was in Sierra Leone with $3.2 million.

**Figure 1:** **URBAN WATER SUPPLY: TRENDS IN COVERAGE**
PERCENTAGE OF POPULATION SERVED IN AFRICA



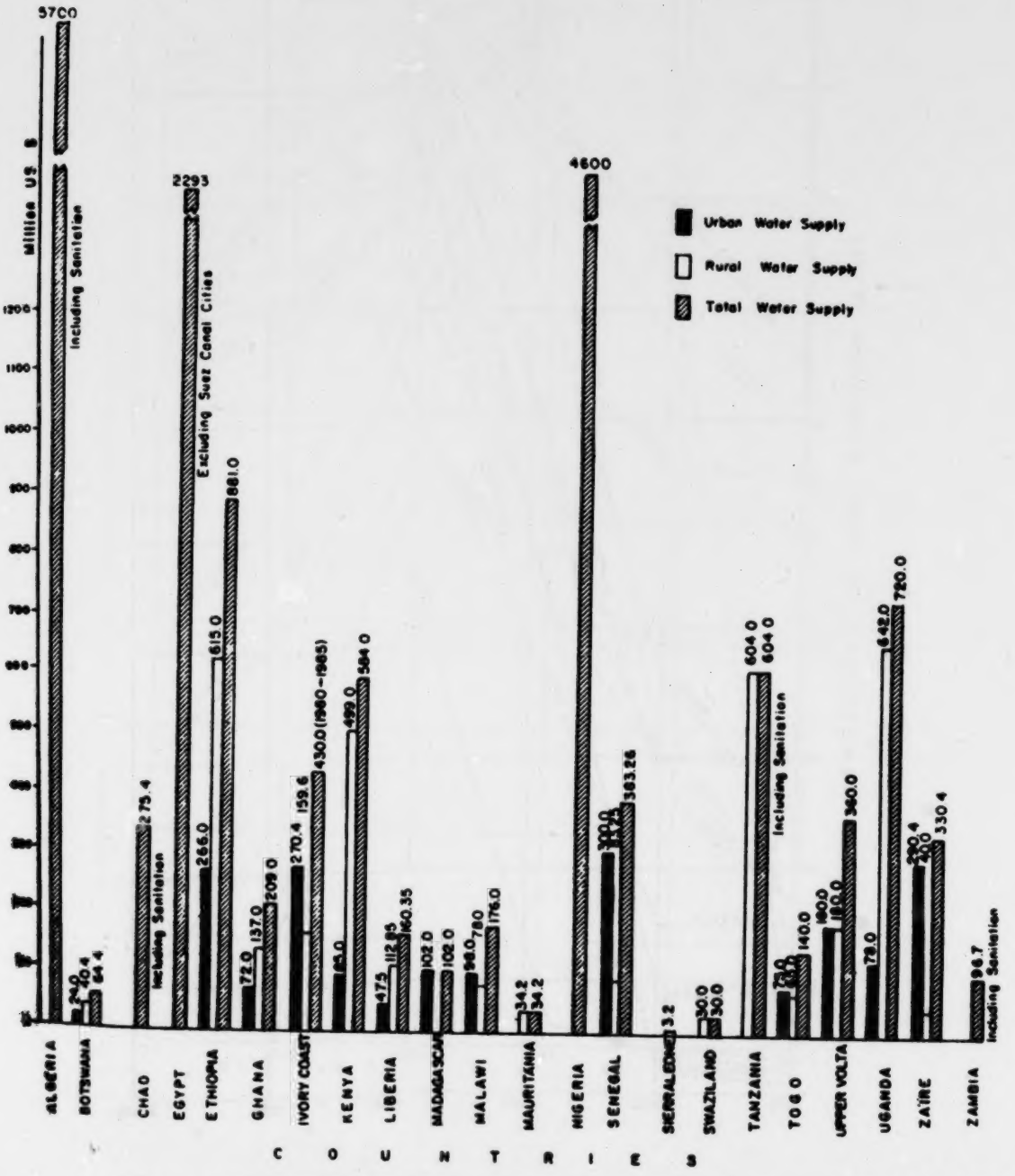

Source: ECA (1980): Problems and Needs of Africa in Community Water Supply and Sanitation

**Figure 2: RURAL WATER SUPPLY: TRENDS IN COVERAGE PERCENTAGE**
PERCENTAGE OF POPULATION SERVED IN AFRICA




Source: ECA (1980): Problems and Needs of Africa in Community Water Supply and Sanitation

**Figure 2:** **INVESTMENT IN MILLION US DOLLARS REQUIRED FOR THE DECADE**
URBAN AND RURAL WATER SUPPLY




Source: ECA (1980): Problems and Needs of Africa in Community Water Supply and Sanitation

## D. Expected External investment

23. While information was provided by 22 countries regarding their total investment needs, 16 provided information about the level of external resources they needed. These are shown in Table 7.

24. It is important to note that high percentage of external resources to total investment was needed. This ranged from a minimum of 17.6% for Togo to 100% for Liberia. The average external requirement for countries providing this information was over 75% of the total investment. Because the information obtained did not cover all countries, and also in view of the fact that the ones provided were uneven for water supply and sanitation both with regard to rehabilitation expansion or completion of on-going projects in rural and urban areas, it was not possible to obtain regional or subregional estimates of per capita and also the total investment needs.

25. It was also clear that the programmes of the different countries had been put together as the totals for various individual projects, with annual expenditures requirements over the 10 year period 1981-1990.

**Table 7: EXTERNAL RESOURCES FOR WATER SUPPLY AND SANITATION FOR THE DECADE AS PERCENTAGE OF TOTAL INVESTMENT**

| Country | Percentage of external resources to total investment for the Decade | |
|---|---|---|
| Botswana | 76.8 | |
| Ethiopia | 69.1 | |
| Ghana | 35 | |
| Guinea | 80 | |
| Kenya | 75 | |
| Liberia | 100 | |
| Madagascar | 94.1 | |
| Malawi | 99.0 | |
| Mauritania | 85 to 90 | |
| Senegal | 92 | |
| Sierra Leone | 100 | |
| Somalia | 81.0 | |
| Togo | 17.6 | |
| Uni. Rep. of Tanzania | 80/90.0 | For total water supply and sanitation<br>For rural water supply and sanitation |
| Zaire | 54* | 29% upto 1985 |
| Zambia | 80.0 | |

Source: UNECA (1980): Problems & needs of Africa in Community water supply & sanitation for the IDWSSD.

* For urban water supply and sanitation.

# III REQUIRED IMPLEMENTATION TO ACHIEVE DECADE OBJECTIVES BY 1990 OR 2000

26. Three years into the Decade at the end of 1983, it became clear that inspite of the preparations which the countries of the regional had made there were dificulties in achieving the planned rates of implementation. Sector planning, project preparation and appraisal, mobilisation of financial resources, operation and maintenance and the role of rural committees in particular had emerged as serious issues.

27. The ECA therefore undertook in 1984 a regional study to:-

(i) estimate the additional numbers of people that had to be supplied with drinking water each year assuming the decade objectives (100% coverage) were to be achieved by 1990 or 2000 respectively;

(ii) estimate the additional numbers of people that had to be suppliedassuming the percentage coverages attained in the countries as of 1980, were to be maintained by 1990, or 2000 respectively.

(iii) compare the above estimates with the average annual numbers of people that were actually provided with drinking water over the period 1970-1980. 3/ The results are presented in Table 8.

## A. Drinking water supply targets

28. From the table it is seen that if the objectives of the IDWSSD were to be achieved by 1990 then the additional number of people to be covered would have to be about 46.7 million per year (13.5 and 33.2 million for the urban and rural areas respectively). This means that the rate of coverage over the 1981-1990 decade would have to be 6.6 times per year (4.1 and 8.8 times for the urban and rural areas respectively) of the actual performance attained by the countries over the previous decade (1970-80).

29. On the other hand if the objectives (100% coverage) were to be attained by year 2000 then the additional number of people to be covered will have to be about 34.2 million per year (13.4 and 20.8 million for the urban and rural areas respectively). This means that the rate of coverage over the 1981-2000 period would have to be 4.9 times per year (4.1 and 5.5 times for the urban and rural areas respectively) of the actual performance attained by the countries over the previous decade (1970-80).

30. For the scenario that the percentage coverage attained in 1980, is to be maintained by 1990 then the annual rate over 1981-1990 will be 7.6 million (5.9 and 1.7 million for the urban and rural areas respectively). This would mean that the annual rate of coverage will be 1.1 times (1.8 and 0.44 for the urban and rural areas respectively) of the actual performance achieved over the decade 1970-1980.

## Table 8: PROGRESS AND PLANNING IN COMMUNITY WATER SUPPLY (1000 INHABITANTS/YEAR)

| No. | Country | Recorded progress from 1970 to 1980 | | | Programme to achieve IDWSSD objectives | | | | | | Required progress to maintain 1980 level | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | By 1990 | | | By 2000 | | | Up to 1990 | | | Up to 2000 | | |
| | | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural |
| 1.0 | Western Oceanic Territories | 4.0 | 0.2 | 3.8 | 27.3 | 2.0 | 25.3 | 16.4 | 2.2 | 14.2 | 2.5 | 1.3 | 1.2 | 2.4 | 1.8 | 0.6 |
| 1.1 | Cape Verde | 4.0 | 0.2 | 3.8 | 26.6 | 0.6 | 26.0 | 15.8 | 1.1 | 14.7 | 2.1 | 0.6 | 1.5 | 2.3 | 1.1 | 1.2 |
| 1.2 | Sao Tome & Principe | | | | 1.1 | 1.4 | -0.3 | 0.6 | 1.1 | -0.5 | 0.4 | 0.1 | -0.3 | 0.1 | 0.7 | -0.6 |
| 2.0 | Northern Africa | 2,170.4 | 1,242.5 | 927.9 | 6,382.7 | 3,435.9 | 2,946.8 | 4,880.5 | 3,108.7 | 1,771.8 | 1,990.9 | 1,702.1 | 288.8 | 2,181.9 | 1,943.5 | 238.4 |
| 2.1 | Morocco | 31.9 | (20.5) | (11.4) | 1,942.1 | (781.4) | (1,160.2) | 1,404.5 | (731.4) | (612.9) | 392.3 | 328.3 | 64.0 | 443.1 | 387.9 | 55.2 |
| 2.2 | Algeria | 327.8 | 58.2 | 269.6 | 1,816.8 | 1,306.7 | 510.1 | 1,413.2 | 1,111.4 | 301.8 | 417.1 | 402.9 | 14.2 | 467.4 | 443.3 | 24.1 |
| 2.3 | Tunisia | 142.0 | 123.7 | 18.3 | 401.9 | 301.2 | 100.7 | 279.3 | 150.2 | 129.1 | 149.9 | 145.9 | 4.0 | 152.4 | 150.2 | 2.2 |
| 2.4 | Libya | 168.7 | 88.1 | 80.6 | 150.0 | 127.2 | 22.8 | 162.0 | 140.4 | 21.6 | 135.0 | 127.2 | 7.8 | 153.5 | 140.4 | 13.1 |
| 2.5 | Egypt | 1,500.0 | 952.0 | 548.0 | 2,071.9 | 918.9 | 1,153.0 | 1,621.6 | 975.1 | 646.5 | 896.6 | 697.8 | 198.8 | 965.5 | 821.7 | 143.8 |
| 3.0 | Sahelian Countries | 779.2 | 183.1 | 596.1 | 3,196.8 | 698.0 | 2,498.8 | 2,289.4 | 700.5 | 1,588.9 | 348.1 | 215.5 | 132.6 | 412.5 | 263.1 | 149.4 |
| 3.1 | Mauritania | 100.8 | 19.7 | 81.1 | 99.9 | 97.6 | 2.3 | 90.7 | 85.8 | 4.9 | 23.7 | 32.9 | -9.2 | 32.2 | 34.4 | -2.2 |
| 3.2 | Senegal | 150.2 | 93.0 | 57.2 | 523.2 | 98.0 | 425.2 | 377.5 | 118.2 | 259.3 | 88.2 | 64.8 | 23.4 | 113.6 | 91.1 | 22.5 |
| 3.3 | Gambia | 13.9 | 5.8 | 8.1 | 60.4 | 9.3 | 51.1 | 43.1 | 11.4 | 31.7 | 8.3 | 6.3 | 2.0 | 10.9 | 8.8 | 2.1 |
| 3.4 | Mali | 27.7 | 27.1 | 0.6 | 883.3 | 198.6 | 684.7 | 608.2 | 190.5 | 417.7 | 34.7 | 34.6 | 0.1 | 47.2 | 47.1 | 0.1 |
| 3.5 | Upper Volta | 348.6 | 29.2 | 319.4 | 661.4 | 72.0 | 589.4 | 472.1 | 78.9 | 393.2 | 90.8 | 32.1 | 58.7 | 96.5 | 33.7 | 62.8 |
| 3.6 | Niger | 104.3 | 6.6 | 97.7 | 546.5 | 102.1 | 442.4 | 410.6 | 108.6 | 302.0 | 71.1 | 27.6 | 43.5 | 75.1 | 26.5 | 48.6 |
| 3.7 | Chad | 33.7 | 1.7 | 32.0 | 424.1 | 120.4 | 303.7 | 287.3 | 107.3 | 180.0 | 31.3 | 17.2 | 14.1 | 37.0 | 21.5 | 15.5 |
| 4.0 | West Middle Africa | 1,777.6 | 766.0 | 1,011.6 | 12,239.4 | 2,832.4 | 9,407.0 | 9,127.9 | 3,143.0 | 5,984.9 | 2,071.9 | 1,514.1 | 557.8 | 2,555.2 | 2,036.0 | 519.2 |
| 4.1 | Guinea Bissau | (7.4) | (0.4) | (7.0) | 34.4 | 18.4 | 36.0 | 35.5 | 15.2 | 20.3 | 2.8 | 1.6 | 1.2 | 3.3 | 2.1 | 1.2 |
| 4.2 | Guinea | 80.2 | 37.1 | 43.1 | 537.0 | 92.4 | 444.6 | 379.2 | 107.8 | 271.4 | 69.2 | 59.5 | 9.7 | 89.9 | 79.4 | 10.5 |
| 4.3 | Sierra Leone | 19.8 | 17.9 | 1.9 | 410.0 | 102.1 | 307.9 | 279.2 | 99.4 | 179.8 | 34.7 | 33.9 | 0.8 | 43.9 | 43.1 | 0.8 |
| 4.4 | Liberia | -5.2 | -4.5 | -0.7 | 266.6 | 105.2 | 161.4 | 192.4 | 92.4 | 100.0 | 8.9 | 7.4 | 1.5 | 11.2 | 9.6 | 1.6 |
| 4.5 | Ivory Coast | 290.8 | 63.4 | 227.4 | 614.0 | 363.8 | 250.2 | 497.5 | 330.6 | 166.9 | 160.9 | 111.1 | 49.8 | 184.1 | 131.9 | 52.2 |
| 4.6 | Ghana | 203.1 | 46.3 | 156.8 | 1,117.8 | 445.1 | 672.7 | 865.6 | 442.6 | 423.0 | 231.3 | 177.2 | 54.1 | 280.3 | 225.1 | 55.2 |
| 4.7 | Togo | 56.0 | 8.1 | 47.9 | 268.3 | 50.0 | 218.3 | 197.5 | 57.0 | 140.5 | 42.0 | 26.8 | 15.2 | 52.2 | 36.4 | 15.8 |
| 4.8 | Benin | -8.9 | 6.6 | -15.5 | 414.9 | 179.2 | 235.7 | 302.2 | 163.2 | 139.0 | 45.0 | 42.3 | 2.7 | 53.0 | 49.1 | 3.9 |
| 4.9 | Nigeria | 1,134.4 | 590.7 | 543.7 | 8,556.4 | 1,476.2 | 7,080.2 | 6,378.8 | 1,834.8 | 4,544.0 | 1,477.1 | 1,054.3 | 422.8 | 1,837.3 | 1,459.3 | 378.0 |
| 5.0 | East Middle Africa | 414.2 | 254.4 | 159.8 | 6,292.0 | 1,413.0 | 4,879.0 | 4,273.2 | 1,369.9 | 2,903.3 | 514.4 | 448.7 | 65.7 | 631.9 | 565.7 | 66.2 |
| 5.1 | Sudan | 139.6 | 112.5 | 27.3 | 2,014.3 | 605.9 | 1,408.4 | 1,399.0 | 572.7 | 826.3 | 224.3 | 189.2 | 35.1 | 265.3 | 229.5 | 35.8 |
| 5.2 | Ethiopia | 212.9 | 102.8 | 110.1 | 3,763.0 | 614.3 | 3,148.7 | 2,551.9 | 644.7 | 1,902.2 | 251.9 | 228.4 | 23.5 | 327.0 | 301.6 | 25.4 |
| 5.3 | Djibouti | (9.8) | (9.2) | 0.6 | 14.6 | 8.3 | 6.3 | 11.3 | 8.2 | 3.1 | 5.2 | 5.1 | 0.1 | 6.1 | 6.0 | 0.1 |
| 5.4 | Somalia | 51.7 | 29.9 | 21.8 | 500.1 | 184.5 | 315.6 | 311.0 | 144.3 | 166.7 | 33.0 | 26.0 | 7.0 | 33.5 | 28.6 | 4.9 |
| 6.0 | Equatorial Africa | 1,113.7 | 427.0 | 686.7 | 11,212.1 | 3,008.5 | 8,203.6 | 8,123.4 | 2,819.7 | 5,303.7 | 1,198.0 | 823.1 | 374.9 | 1,467.2 | 1,041.9 | 425.3 |
| 6.1 | Zaire | 107.7 | 92.0 | 15.7 | 3,476.1 | 1,579.0 | 1,847.1 | 2,327.5 | 1,280.7 | 1,046.8 | 173.4 | 161.4 | 12.0 | 204.2 | 191.7 | 12.5 |
| 6.2 | Central Afr. Rep. | 30.6 | 22.6 | 8.0 | 260.9 | 121.1 | 139.8 | 177.9 | 99.3 | 78.6 | 17.0 | 16.3 | 0.7 | 20.4 | 19.5 | 0.9 |
| 6.3 | Equat. Guinea | | | | 40.2 | 25.3 | 14.9 | 27.4 | 19.3 | 8.1 | 26.1 | 26.5 | -0.4 | 3.0 | 3.0 | 0.0 |
| 6.4 | Gabon | 19.0 | 17.3 | 1.7 | 44.3 | 11.3 | 33.0 | 27.9 | 11.4 | 16.5 | 8.7 | 8.8 | -0.1 | 9.6 | 9.6 | 0.0 |
| 6.5 | Congo | 6.0 | 7.4 | -1.4 | 164.6 | 50.6 | 114.0 | 116.7 | 49.7 | 67.0 | 18.2 | 17.5 | 0.7 | 24.4 | 23.7 | 0.7 |
| 6.6 | Cameroon | 106.7 | 85.1 | 21.6 | 787.1 | 343.3 | 443.8 | 548.5 | 305.8 | 242.7 | 138.7 | 135.9 | 2.8 | 154.4 | 148.4 | 6.0 |
| 6.7 | Uganda | | | | 1,683.2 | 262.3 | 1,420.0 | 1,197.8 | 273.1 | 924.7 | 79.7 | 51.2 | 28.5 | 103.4 | 72.0 | 31.4 |
| 6.8 | Kenya | 254.8 | 73.8 | 181.0 | 2,097.1 | 303.7 | 1,793.4 | 1,663.9 | 395.9 | 1,268.0 | 279.9 | 195.1 | 84.8 | 383.1 | 286.9 | 96.2 |
| 6.9 | Rwanda | (62.0) | (4.0) | (58.0) | 384.9 | 29.0 | 355.9 | 326.1 | 35.6 | 290.5 | 108.8 | 10.7 | 98.1 | 132.0 | 16.8 | 115.2 |
| 6.10 | Burundi | 92.1 | 2.2 | 89.9 | 452.0 | 6.0 | 446.0 | 310.6 | 10.1 | 300.5 | 32.4 | 6.0 | 26.4 | 40.1 | 10.1 | 30.0 |
| 6.11 | Tanzania | 434.8 | 122.6 | 312.2 | 1,872.6 | 276.9 | 1,595.7 | 1,399.1 | 338.8 | 1,060.3 | 315.1 | 193.7 | 121.4 | 392.6 | 260.2 | 132.4 |
| 7.0 | Southern Africa | 702.4 | 349.0 | 353.4 | 6,322.1 | 1,943.2 | 4,378.9 | 4,796.7 | 2,085.4 | 2,711.3 | 1,328.9 | 1,065.3 | 263.6 | 1,595.1 | 1,350.9 | 244.2 |
| 7.1 | Angola | (211.7) | (195.3) | (16.4) | 759.5 | 160.8 | 598.7 | 534.3 | 172.8 | 361.5 | 78.4 | 20.2 | 58.2 | 93.9 | 53.1 | 40.8 |
| 7.2 | Zambia | 236.3 | 44.5 | 191.8 | 411.6 | 234.8 | 176.8 | 365.7 | 235.2 | 130.5 | 153.8 | 99.1 | 54.7 | 182.3 | 124.7 | 57.6 |
| 7.3 | Malawi | 125.7 | 26.2 | 99.5 | 689.1 | 460.7 | 228.4 | 513.5 | 386.4 | 127.1 | 47.8 | 63.8 | -16.0 | 61.4 | 65.3 | -3.9 |
| 7.4 | Namibia | | | | 121.3 | 66.4 | 54.9 | 83.8 | 52.7 | 31.1 | 14.0 | 5.9 | 8.1 | 7.5 | 6.9 | 0.6 |
| 7.5 | Botswana | 14.8 | 10.0 | 4.8 | 79.1 | 45.8 | 33.3 | 63.3 | 43.6 | 19.7 | 18.7 | 20.1 | -1.4 | 22.2 | 21.8 | 0.4 |
| 7.6 | Mozambique | 88.4 | 68.0 | 20.4 | 1,274.1 | 93.4 | 1,180.7 | 877.3 | 126.9 | 750.4 | 90.0 | 81.6 | 8.4 | 125.1 | 115.8 | 9.3 |
| 7.7 | Zimbabwe | | | | 775.1 | 147.5 | 627.6 | 599.4 | 196.1 | 403.3 | 177.4 | 147.5 | 29.9 | 227.4 | 196.1 | 31.3 |
| 7.8 | Lesotho | 15.3 | 2.7 | 12.6 | 154.6 | 7.0 | 147.6 | 102.1 | 9.2 | 92.9 | 8.7 | 5.6 | 3.1 | 11.2 | 7.8 | 3.4 |
| 7.9 | Swaziland | 10.2 | 2.3 | 7.9 | 52.5 | 3.8 | 48.7 | 39.6 | 5.7 | 33.9 | 9.3 | 3.7 | 5.6 | 11.9 | 5.7 | 6.2 |
| 7.10 | South Africa | | | | 2,005.2 | 223.0 | 1,282.2 | 1,617.7 | 856.7 | 761.0 | 730.8 | 617.8 | 113.0 | 852.2 | 753.7 | 98.5 |
| 8.0 | East Oceanic Territories | 93.2 | 46.8 | 46.4 | 1,018.5 | 176.2 | 842.3 | 707.3 | 199.7 | 507.6 | 132.4 | 117.7 | 14.7 | 164.6 | 150.1 | 14.5 |
| 8.1 | Madagascar | 90.6 | 46.0 | 44.6 | 976.4 | 150.6 | 825.5 | 671.4 | 174.8 | 496.6 | 106.3 | 95.0 | 11.3 | 138.5 | 127.1 | 11.4 |
| 8.2 | Comores | | | | 22.1 | 3.9 | 18.2 | 18.2 | 5.0 | 13.2 | 9.2 | 3.9 | 5.3 | 10.5 | 5.1 | 5.4 |
| 8.3 | Mauritius | | | | 17.1 | 19.2 | -2.1 | 15.1 | 17.6 | -2.5 | 15.3 | 17.4 | -2.1 | 14.0 | 16.5 | -2.5 |
| 8.4 | Seychelles | 2.6 | 0.8 | 1.8 | 2.9 | 2.5 | 0.4 | 2.6 | 7.3 | 0.3 | 1.6 | 1.4 | 0.2 | 1.6 | 1.4 | 0.2 |
| | Total | 7,054.7 | 3,249.0 | 3,785.7 | 46,690.9 | 13,509.2 | 33,181.7 | 34,241.8 | 13,429.1 | 20,785.7 | 7,587.1 | 5,887.8 | 1,669.3 | 9,010.8 | 7,353.0 | 1,652.8 |

Source: UN ECA (1984), unpublished

31. Again if the 1980 percentage is to be maintained by year 2000, then the annual rate over 1981-2000, will be 9.0 million (7.3 and 1.7 million for the urban and rural areas respectively. This would mean that the annual rate of coverage will be 1.3 times (2.2 and 0.44 for the urban and rural areas respectively) of the actual performance achieved over the decade 1970-1980.

## B. Drinking water supply investment requirements

32. The ECA 1984 study also attempted in the same exercise regional estimate of the investment and operation and maintenance costs of the Decade programme on the two assumptions that the objectives (100% coverage) would be attained by the end of 1990 or 2000. The approach was based first on an estimation of per capita investment costs for the 1970-80 period as established in 1970 from performance data over that period. The second was to establish the operation and maintenance costs (taken as the cost of production of unit volume of water) for the same period. The third was to use cost data available for 13 countries in the region obtained from the 1983 evaluation together with the 1970-80 data to estimate per capita investment and the unit operation and maintenance costs for the 1981-1990 decade. The estimated per capita and unit costs are presented in Table 9. Using the unit costs from this table the investment costs for the first year (viz 1970) and also the period 1970-80 were estimated. Secondly the costs for the 13 countries for which data was available was computed for 1980 and then for the decade 1981-1990. The results are presented in Table 10. Finally, estimate of the total cost (investment and operation and maintenance) to achieve the objectives of the decade by 1990 or 2000 were computed. These results are presented in Table 11. The costs in Table 11 include the cost of providing water for livestock in the rural areas, which is an important component of the rural water demand.

33. It is seen from Table 10 that the investment cost over the 1970-80 period was $3.54 billion. The investment cost in the first year of that period (viz 1970) accounted for 3.6% of the total investment in the 10 years while external assistance in the same first year accounted for 6.5% over the 10 year period. From Table 11, it is seen that the estimated total investment required to achieve the objective of the decade by 1990 would be $42.2 billion with an annual operation and maintenance cost of $4.9 billion. The total investment would be made up of $20.7 billion for the rural areas and $21.5 billion for the urban areas.

34. On the other hand if the objectives were to be achieved by 2000, the total investment would be $64.1 billion with an annual operation and maintenance cost of $ 10.1 billion. The total investment would be made up of $27.0 billion for the rural areas and $37.1 billion for the urban areas. The difference between the urban and rural costs is due to the greater urbanization that is expected, higher standards of living and therefore greater consumption of water and higher levels of service.

35. The results from the ECA studies as presented in Tables 8 and 11 should have been prepared during the preparatory stage in 1980. It would then have provided the basis to assess how realistic the targets set by the countries were, having regard to their actual performance over the 1970-1980 period, and to evaluate their progress in future.

**Table 8: INVESTMENT AND OPERATION COST FOR DRINKABLE WATER SUPPLY (US$/INHABITANTS)**

| No. | Country | 1970 Urban: House Connexion | 1970 Urban: Public Distribution | 1970 Rural | 1980 Urban: House Connexion | 1980 Urban: Public Distribution | 1980 Rural | Adopted Costs: Urban House Connexion | Adopted Costs: Urban Public Distribution | Adopted Costs: Rural | Operation Cost (US$/m³) | Tariff (US$/m³) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | Western Oceanic Territories | | | | | | | | | | | |
| 1.1 | Cape Verde | | | | 36 | 13 | 26 | 36 | 13 | 26 | 1.84 | 0.16 |
| 1.2 | Sao Tome & Principe | | | | | | | (56) | (25) | (26) | (0.50) | |
| 2.0 | Northern Africa | | | | | | | | | | | |
| 2.1 | Morocco | 120 | 25 | 20 | 200 | 77 | 115 | 200 | 77 | 115 | (0.80) | |
| 2.2 | Algeria | 120 | 25 | 20 | 135[1] | | | (200) | (77) | (115) | (0.80) | |
| 2.3 | Tunisia | 32 | 11 | 13 | 250 | | 200 | 250 | (80) | 200 | (0.80) | 0.31 |
| 2.4 | Libya | 32 | 11 | | 1000 | | | (200) | (77) | (115) | (0.80) | 0.07 |
| 2.5 | Egypt | 20 | 11 | 12 | 70[1] | | | (150) | (70) | (100) | (0.80) | 0.04[1] |
| 3.0 | Sahelian Countries | | | | | | | | | | | |
| 3.1 | Mauritania | 300 | 280 | 50 | 470 | | 50 | 470 | (75) | 50 | (0.40) | |
| 3.2 | Senegal | 56 | | | | | | (150) | (75) | (50) | 0.40 | 0.46 |
| 3.3 | Gambia | 20 | | 46 | | | | (150) | (75) | (50) | (0.40) | |
| 3.4 | Mali | 38 | 25 | 20 | 425 | | 246 | 425 | (75) | (50) | 0.24 | 0.18 |
| 3.5 | Upper Volta | 200 | 5 | 20 | 100 | 40 | 25 | 100 | 40 | 52 | 0.23 | 0.40 |
| 3.6 | Niger | 56 | 25 | | 143 | 52 | 40 | 143 | 52 | 40 | (0.23) | |
| 3.7 | Chad | 52 | 17 | 22 | | | | (143) | (52) | (40) | (0.23) | |
| 4.0 | West Middle Africa | | | | | | | | | | | |
| 4.1 | Guinea Bissau | | | | | | | (80) | (25) | (20) | (0.40) | 0.15 |
| 4.2 | Guinea | 80 | 25 | 20 | 27 | 2 | 21 | 80 | 25 | 20 | 0.40 | 0.50 |
| 4.3 | Sierra Leone | 120 | 70 | 60 | 350 | 300 | 60 | 350 | (90) | 60 | 0.80 | 0.20 |
| 4.4 | Liberia | 50 | 5 | 10 | | | | (100) | (80) | (80) | (0.80) | |
| 4.5 | Ivory Coast | 70 | 60 | 10 | | | | (100) | (80) | (80) | (0.30) | |
| 4.6 | Ghana | 40 | 25 | 50 | 100 | 80 | 80 | 100 | 80 | 80 | 0.30 | 0.20 |
| 4.7 | Togo | 56 | | 20 | 95 | | 29 | 95 | (42) | 29 | 0.66 | 0.31 |
| 4.8 | Benin | 12 | 9 | 6 | 100 | 25 | 20 | 100 | 25 | 20 | 0.30 | 0.33 |
| 4.9 | Nigeria | 30 | 30 | 13 | | | | (100) | (25) | (20) | (0.30) | |
| 5.0 | East Middle Africa | | | | | | | | | | | |
| 5.1 | Sudan | 45 | 15 | 20 | | | | (100) | (40) | (20) | (0.50) | |
| 5.2 | Ethiopia | 100 | 40 | 20 | | | | 100 | 40 | 20 | (0.50) | |
| 5.3 | Djibouti | | | | 75 | 27 | 250 | 75 | 27 | 250 | (0.50) | 0.42 |
| 5.4 | Somalia | 15 | 1 | 13 | | | | (100) | (40) | (20) | (0.50) | |
| 6.0 | Equatorial Africa | | | | | | | | | | | |
| 6.1 | Zaire | 100 | 25 | 40 | | | | 100 | 25 | 40 | (0.50) | |
| 6.2 | Central Afr. Rep. | 25 | 12 | 20 | | | | (50) | (25) | (40) | (0.50) | 0.25 |
| 6.3 | Equatorial Guinea | | | | | | | (56) | (25) | (20) | (0.50) | |
| 6.4 | Gabon | 56 | 25 | 20 | | | | 56 | 25 | 20 | (0.50) | |
| 6.5 | Congo | 56 | | 20 | | | | 56 | (25) | 20 | (0.50) | |
| 6.6 | Cameroon | 100 | 25 | 20 | 62.5[2] | | | 100 | 25 | 20 | (0.50) | |
| 6.7 | Uganda | 56 | 3 | 14 | | | | 56 | (25) | (20) | (0.50) | |
| 6.8 | Kenya | 50 | 25 | 15 | 130 | 65 | 93 | 130 | 65 | 93 | 0.30 | 0.25 |
| 6.9 | Rwanda | | | | 100 | 30 | 10 | 100 | 30 | (30) | 0.65 | 0.22 |
| 6.10 | Burundi | 52 | 17 | 22 | | | | 52 | (25) | 22 | 0.39 | 0.29 |
| 6.11 | Tanzania | 40 | 25 | 20 | 40[2] | | | 40 | 25 | 20 | (0.40) | 0.37[1] |
| 7.0 | Southern Africa | | | | | | | | | | | |
| 7.1 | Angola | | | | 90 | | 25 | 90 | (20) | 25 | (0.50) | 0.10 |
| 7.2 | Zambia | 100 | 25 | 31 | 53[1] | | | 100 | 25 | 31 | (0.45) | 0.13[1] |
| 7.3 | Malawi | | | | 40 | 75 | 15 | 40 | 75 | 15 | 0.45 | 0.31 |
| 7.4 | Namibia | | | | | | | (100) | (25) | (31) | (0.50) | |
| 7.5 | Botswana | 200 | 180 | 15 | 100[1] | | | 200 | (100) | 15 | 0.47[1] | 0.38[1] |
| 7.6 | Mozambique | | | | | | | (90) | (20) | (25) | (0.50) | |
| 7.7 | Zimbabwe | | | | | | | (200) | (100) | (15) | (0.50) | |
| 7.8 | Lesotho | 56 | | 20 | 400 | 200 | 100 | 400 | 200 | 100 | 1.00 | 0.33 |
| 7.9 | Swaziland | | | | | | | (200) | (100) | (15) | (1.00) | |
| 7.10 | South Africa | | | | | | | (200) | (100) | (13) | (0.50) | |
| 8.0 | Eastern Oceanic Territories | | | | | | | | | | | |
| 8.1 | Madagascar | 170 | 4 | 1 | 90 | 40 | 35 | 90 | 40 | 35 | (0.50) | 0.26 |
| 8.2 | Comoros | | | | | | | (56) | (25) | (26) | (0.50) | |
| 8.3 | Mauritius | | | | | | | (56) | (25) | (26) | 0.25 | 0.20 |
| 8.4 | Seychelles | | | | | | | (56) | (25) | (26) | (0.50) | 0.25 |

Source: UN ECA (1984), unpublished

## Table 10: AVAILABLE DATA ON INVESTMENT COST FOR 1980[1] AND 1990[2] TARGETS (Millions US$)

| No. | Country | Investment 1970 for 1980[1/] TARGETS | | | | | Investment 1980 for 1990[2/] (IDWSSD) Targets | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total for 1980 | Invest. in 1990 $ | Invest. in 1990 % | External assist. $ | External assist. % | Total for 1990 | National invest. $ | National invest. % | External Assist. $ | External Assist. % | Total $ | 1980 Investme % of total dev ment Investme |
| 1.0 | Western Oceanic Territories | | | | | | | | | | | | |
| 1.1 | Cape-Verde | | | | | | 39.0 | | | | | | |
| 1.2 | Sao-Tome & Principe | | | | | | | | | | | | |
| 2.0 | Northern countries | 1,009.0 | 34.628 | 3.43 | 6.0 | 0.59 | | | | | | | |
| 2.1 | Morocco | 453.0 | 2.720 | 0.60 | 0.0 | 0.0 | | | | | | | |
| 2.2 | Algeria | 381.8 | 17.270 | 4.52 | | | | | | | | | (1.6) |
| 2.3 | Tunisia | 41.5 | 3.200 | 7.71 | 0.0 | 0.0 | 1,393.0 | | | | | | |
| 2.4 | Libya | 17.6 | 1.438 | 8.17 | 0.0 | 0.0 | | | | | | | |
| 2.5 | Egypt | 115.1 | 10.000 | 8.69 | 6.0 | 5.21 | 3,700.0 | | | | | | |
| 3.0 | Sahelian countries | 206.5 | 13.166 | 6.38 | 58.2 | 28.18 | | | | | | | |
| 3.1 | Mauritania | 30.8 | 0.055 | 0.18 | 10.0 | 32.47 | 30.0 | 0.4 | 0.3 | 2.5 | 0.3 | 2.9 | |
| 3.2 | Senegal | 35.8 | 4.600 | 12.85 | 23.8 | 66.48 | 1,027.0 | | | | | | 3.2 |
| 3.3 | Gambia | 4.8 | 0.314 | 6.54 | 1.5 | 31.25 | 53.0 | | | | | | 6.0 |
| 3.4 | Mali | 54.0 | 1.200 | 2.22 | 4.0 | 7.41 | 1,762.0 | 0.0 | 0.0 | 0.6 | 0.03 | 0.6 | 1.8 |
| 3.5 | Upper-Volta | 40.9 | 3.078 | 7.53 | 3.1 | 7.58 | 400.0 | 0.1 | 0.03 | 6.7 | 1.67 | 6.8 | 4.5 |
| 3.6 | Niger | 20.6 | 2.232 | 10.83 | 11.3 | 54.85 | 986.0 | | | | | 18.6 | 5.4 |
| 3.7 | Chad | 19.6 | 1.687 | 8.61 | 4.5 | 23.0 | | | | | | | |
| 4.0 | West-Middle Africa | 949.8 | 49,718 | 5.23 | 53.8 | 5.66 | | | | | | | |
| 4.1 | Guines-Bissau | | | | | | | | | | | | |
| 4.2 | Guinea | 40.4 | | | | | 152.0 | 0.6 | 0.4 | 0.6 | 0.4 | 1.2 | |
| 4.3 | Sierra Leone | 73.2 | 1.640 | 2.24 | 5.0 | 6.83 | 63.0 | 1.5 | 2.4 | 0.4 | 0.6 | 1.9 | 9.0 |
| 4.4 | Liberia | 55.0 | 10.500 | 19.09 | 10.3 | 18.73 | | | | | | | |
| 4.5 | Ivory-Coast | 46.3 | 1.296 | 2.80 | 2.5 | 5.40 | | | | | | | |
| 5.6 | Ghana | 166.2 | 8.700 | 5.23 | 3.3 | 1.99 | 840.0 | 23.0 | 2.7 | 9.0 | 1.1 | 32.0 | 6.0 |
| 5.7 | Togo | 22.7 | 0.292 | 1.29 | 2.0 | 8.81 | 41.0 | 2.9 | 7.1 | 2.6 | 6.3 | 5.5 | (3.0) |
| 5.8 | Benin | 6.3 | 1.850 | 29.37 | 8.0 | 126.98 | 202.0 | 1.6 | 0.8 | 14.4 | 7.1 | 16.0 | 5.0 |
| 5.9 | Nigeria | 539.7 | 25,440. | 4.71 | 22.7 | 4.21 | | | | | | | |
| 6.0 | East-Middle Africa | 381.4 | 35.700 | 9.36 | 68.5 | 17.96 | | | | | | | |
| 6.1 | Sudan | 96.4 | 23.900 | 24.8 | 36.3 | 37,66 | | | | | | | |
| 6.2 | Ethiopia | 272.0 | 6.100 | 2.24 | 13.3 | 4.89 | | | | | | | (6.0) |
| 6.3 | Djibouti | | | | | | 89.5 | | | | | | |
| 6.4 | Somalia | 13.0 | 5.700 | 43.85 | 18.9 | 145.38 | | | | | | | |
| 7.0 | Equatorial Africa | 798.4 | 16.692 | 2.09 | 41.0 | 5.14 | | | | | | | |
| 7.1 | Zaire | 385.4 | 0.348 | 0.09 | 0.2 | 0.05 | | | | | | | |
| 7.2 | Central African Republique | 17.3 | 0.350 | 2.02 | 1.2 | 6.94 | | | | | | | |
| 7.3 | Equatorial Guinea | | | | | | | | | | | | |
| 7.4 | Gabon | 8.0 | 1.990 | 2.49 | 6.5 | 81.25 | | | | | | | |
| 7.5 | Congo | 14.2 | | | | | | | | | | | |
| 7.6 | Cameroun | 117.8 | 0.150 | 0.13 | 5.0 | 4.24 | | | | | | | |
| 7.7 | Uganda | 37.0 | 9.000 | 7.64 | 6.6 | 17.84 | | | | | | | |
| 7.8 | Kenya | 76.8 | 2,900 | 3.78 | 8.1 | 10.55 | 1.336.0 | 15.9 | 1.0 | 5.1 | 0.3 | 21.0 | 14.6 |
| 7.9 | Rwanda | | | | | | 255.0 | | | | | | (5.0) |
| 7.10 | Burundi | 29.7 | 0.154 | 0.52 | 1.5 | 5.05 | 237.0 | 11.4 | 4.8 | 3.1 | 1.3 | 14.5 | 7.5 |
| 7.11 | Tanzania | 112.2 | 1.800 | 1.60 | 12.0 | 10.70 | | | | | | | |
| 8.0 | Southern Africa | 77.5 | 11.550 | 14.90 | 0.3 | 0.39 | | | | | | | |
| 8.1 | Angola | | | | | | 114.0 | 1.1 | 1.0 | 0.6 | 0.5 | 1.7 | |
| 8.2 | Zambia | 66.4 | 10.660 | 16.05 | 0.2 | 0.30 | | | | | | | |
| 8.3 | Malawi | | | | | | 266.0 | 0.2 | 0.08 | 10.0 | 3.8 | 10.2 | 5.8 |
| 8.4 | Namibia | | | | | | | | | | | | |
| 8.5 | Botswana | 4.5 | 0.520 | 11.56 | | | | | | | | | |
| 7.6 | Mozambique | | | | | | | | | | | | |
| 7.7 | Zimbabwe | | | | | | | | | | | | |
| 7.8 | Lesotho | 6.6 | 0.370 | 5.61 | 0.1 | 1.52 | 180.0 | 1.6 | 0.9 | 5.8 | -3.2 | 7.4 | 1.0 |
| 7.9 | Swaziland | | | | | | | | | | | | |
| 7.10 | South Africa | | | | | | | | | | | | |
| 8.0 | Western Oceanic Territories | 120.2 | 0.964 | 0.80 | 2.2 | 1.83 | | | | | | 2.0 | (2.5) |
| 8.1 | Madagascar | 120.2 | 0.964 | 0.80 | 2.2 | 1.83 | | 1.1 | | 0.9 | | | (1.1) |
| 8.2 | Comoros | | | | | | | | | | | 16.5 | 8.9 |
| 8.3 | Mauritius | | | | 0.0 | | | | | | | | (2.8) |
| 8.4 | Seychelles | | | | | | | | | | | | |
| | Total | 3,542,8 | 126.718 | 3.58 | 230.0 | 6.49 | 5,823.0[3/] | 72.8[3/] | 1.25[3/] | 62.3[3/] | 1.0[3/] | | |

Notes: 1/ The cost for 1980 was evaluated in 1970 for the second decade of United Nations for Development and concerns the Drinking Water Programme only (see 7.6)

2/ The cost for 1990 was evaluated in 1980 for the IDWSSD (see 7.1)

3/ For the countries with complete data only.

Source: UNECA (1990) unpublished.

**Source: UN ECA (1984), unpublished**

## Table 11: EVALUATION OF THE COST (INVESTMENT AND OPERATION) FOR COMPLETE DRINKING WATER SUPPLY TO BE ACHIEVED IN 1990 OR 2000

| No. | Country | INVESTMENT ($10^6$ U.S.$) 1990 Urban Individual | Urban Common | Urban Total | Rural Total | Total human population | Total livestock | Total | 2000 Urban Individual | Urban Common | Urban Total | Rural Total | Total human population | Total livestock | Total | Operation ($10^6$ U.S.$/year) 1990 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.0 | Western Oceanic Territories | 1.8 | 0.9 | 2.7 | 4.4 | 7.1 | 0.5 | 7.6 | 2.5 | 1.2 | 3.7 | 4.5 | 8.2 | 0.7 | 8.9 | 3.4 | 6 |
| 1.1 | Cape Verde | 1.6 | 0.7 | 2.3 | 4.4 | 6.7 | 0.4 | 7.1 | 2.3 | 1.0 | 3.3 | 4.5 | 7.8 | 0.4 | 8.2 | 3.0 | 5 |
| 1.2 | Sao Tome & Principe | 0.2 | 0.2 | 0.4 | 0.0 | 0.4 | 0.1 | 0.5 | 0.2 | 0.2 | 0.4 | 0.0 | 0.4 | 0.3 | 0.7 | 0.4 | 0 |
| 2.0 | Northern Countries | 5,233.1 | 966.4 | 6,199.5 | 2,640.9 | 8,840.0 | 2,813.7 | 11,654.1 | 9,069.0 | 1,671.8 | 10,740.8 | 3,014.3 | 13,755.1 | 3,367.4 | 17,122.5 | 1,850.9 | 3,739 |
| 2.1 | Morocco | 835.0 | 409.1 | 1,244.1 | 1,142.3 | 2,386.4 | 1,469.5 | 3,855.9 | 1,482.0 | 726.3 | 2,208.3 | 1,293.5 | 3,501.8 | 1,750.0 | 5,251.8 | 528.8 | 1,062 |
| 2.2 | Algeria | 2,108.6 | 300.3 | 2,408.9 | 428.4 | 2,837.3 | 332.5 | 3,169.8 | 3,462.8 | 493.1 | 3,955.9 | 522.7 | 4,478.6 | 439.0 | 4,917.6 | 415.3 | 845 |
| 2.3 | Tunisia | 403.8 | 52.7 | 456.5 | 349.0 | 805.5 | 747.6 | 1,553.1 | 712.3 | 93.0 | 805.3 | 314.8 | 1,120.1 | 781.9 | 1,902.0 | 70.4 | 144 |
| 2.4 | Libya | 285.0 | 5.8 | 290.8 | 0.0 | 290.8 | 15.6 | 306.4 | 615.6 | 12.5 | 628.1 | 0.0 | 628.1 | 16.3 | 644.4 | 117.4 | 239 |
| 2.5 | Egypt | 1,600.7 | 198.5 | 1,799.2 | 721.2 | 2,520.4 | 248.5 | 2,768.9 | 2,768.9 | 346.9 | 3,143.2 | 883.3 | 4,026.5 | 380.2 | 4,406.7 | 719.0 | 1,447 |
| 3.0 | Sahelian Countries | 1,213.4 | 381.6 | 1,595.0 | 961.9 | 2,556.9 | 1,442.2 | 3,999.1 | 1,980.2 | 614.5 | 2,594.7 | 1,270.4 | 3,865.1 | 2,160.8 | 6,025.9 | 143.8 | 299 |
| 3.1 | Mauritania | 100.6 | 48.0 | 148.6 | 7.2 | 155.8 | 10.3 | 166.1 | 145.2 | 69.5 | 214.7 | 28.9 | 243.6 | 43.6 | 287.2 | 12.0 | 25 |
| 3.2 | Senegal | 196.7 | 130.3 | 327.0 | 109.2 | 436.2 | 191.7 | 627.9 | 319.7 | 211.8 | 531.5 | 129.7 | 661.2 | 261.8 | 923.0 | 26.0 | 54 |
| 3.3 | Gambia | 11.3 | 13.0 | 24.3 | 17.8 | 42.1 | 54.6 | 96.8 | 18.5 | 21.6 | 40.1 | 22.5 | 62.6 | 84.4 | 147.0 | 2.7 | 5 |
| 3.4 | Mali | 564.8 | 81.5 | 646.3 | 320.8 | 967.1 | 433.6 | 1,400.7 | 930.8 | 134.4 | 1,065.2 | 409.0 | 1,474.2 | 603.0 | 2,077.2 | 24.5 | 51 |
| 3.5 | Upper Volta | 121.5 | 31.0 | 152.5 | 240.4 | 392.9 | 334.2 | 727.1 | 197.8 | 50.6 | 248.4 | 322.4 | 570.8 | 513.2 | 1,084.0 | 24.1 | 48 |
| 3.6 | Niger | 153.7 | 22.8 | 176.5 | 157.3 | 333.8 | 247.9 | 581.7 | 265.4 | 39.4 | 304.8 | 223.9 | 528.7 | 396.0 | 924.7 | 28.6 | 58 |
| 3.7 | Chad | 64.8 | 55.0 | 119.8 | 109.2 | 229.0 | 169.9 | 398.9 | 102.8 | 87.2 | 190.0 | 134.0 | 324.0 | 258.8 | 582.8 | 25.3 | 54 |
| 4.0 | West-Middle Africa | 3,871.2 | 1,641.9 | 5,513.1 | 1,175.8 | 6,688.9 | 484.9 | 7,173.8 | 6,332.7 | 2,700.5 | 9,033.2 | 1,393.2 | 10,426.7 | 655.5 | 11,082.2 | 323.6 | 667 |
| 4.1 | Guinea-Bissau | 15.4 | 3.3 | 18.7 | 4.4 | 23.1 | 4.1 | 27.2 | 24.4 | 5.3 | 29.7 | 3.9 | 33.6 | 4.5 | 38.1 | 2.0 | 5 |
| 4.2 | Guinea | 45.9 | 43.1 | 89.0 | 61.5 | 150.5 | 67.6 | 218.2 | 77.3 | 72.4 | 149.7 | 74.4 | 224.1 | 93.4 | 317.5 | 31.3 | 63 |
| 4.3 | Sierra Leone | 198.8 | 76.6 | 275.4 | 160.9 | 436.3 | 65.5 | 501.8 | 347.2 | 133.8 | 481.0 | 186.3 | 667.3 | 87.9 | 755.2 | 18.5 | 38 |
| 4.4 | Liberia | 92.3 | 49.2 | 141.5 | 90.2 | 231.7 | 37.6 | 269.3 | 154.3 | 82.2 | 236.5 | 102.1 | 338.6 | 61.2 | 399.8 | 46.4 | 93 |
| 4.5 | Ivory Coast | 484.0 | 52.8 | 536.8 | 51.2 | 588.0 | 27.5 | 615.5 | 805.2 | 87.8 | 893.0 | 64.1 | 957.1 | 41.6 | 998.7 | 46.2 | 94 |
| 4.6 | Ghana | 251.7 | 342.8 | 594.5 | 350.1 | 944.6 | 95.9 | 1,040.5 | 425.6 | 579.7 | 1,005.3 | 464.8 | 1,470.1 | 137.1 | 1,607.2 | 54.2 | 113 |
| 4.7 | Togo | 32.1 | 42.5 | 74.6 | 38.7 | 113.3 | 16.1 | 129.4 | 54.9 | 72.8 | 127.7 | 47.5 | 175.2 | 20.9 | 196.1 | 22.7 | 47 |
| 4.8 | Benin | 99.0 | 37.1 | 136.1 | 33.5 | 169.6 | 18.5 | 188.1 | 165.2 | 62.0 | 227.2 | 38.2 | 265.4 | 23.3 | 288.7 | 19.2 | 40 |
| 4.9 | Nigeria | 2,652.0 | 994.5 | 3,646.5 | 385.3 | 4,031.8 | 152.1 | 4,183.9 | 4,278.6 | 1,604.5 | 5,883.1 | 412.2 | 6,295.3 | 185.6 | 6,480.9 | 83.1 | 171 |
| 5.0 | East-Middle Africa | 1,265.4 | 264.0 | 1,529.4 | 888.4 | 2,417.8 | 3,349.3 | 5,767.1 | 2,213.4 | 455.6 | 2,669.0 | 1,063.2 | 3,732.2 | 4,302.8 | 8,035.0 | 347.8 | 710 |
| 5.1 | Sudan | 904.2 | 19.0 | 923.2 | 212.5 | 1,135.7 | 445.8 | 1,581.5 | 1,583.8 | 33.4 | 1,617.2 | 226.2 | 1,843.4 | 535.9 | 2,379.3 | 188.8 | 386 |
| 5.2 | Ethiopia | 305.3 | 183.2 | 488.5 | 600.0 | 1,088.5 | 2,368.0 | 3,456.5 | 542.1 | 325.2 | 867.3 | 749.7 | 1,617.0 | 3,030.4 | 4,647.4 | 102.6 | 211 |
| 5.3 | Djibouti | 4.7 | 0.4 | 5.1 | 16.8 | 21.9 | 153.7 | 175.6 | 7.1 | 0.6 | 7.7 | 27.2 | 34.9 | 314.3 | 349.2 | 1.4 | 2 |
| 5.4 | Somalia | 51.2 | 61.4 | 112.6 | 59.1 | 171.7 | 381.8 | 553.5 | 80.4 | 96.4 | 176.8 | 60.1 | 236.9 | 422.2 | 659.1 | 55.0 | 109 |
| 6.0 | Equatorial Africa | 2,962.0 | 343.7 | 3,305.7 | 2,831.4 | 6,137.1 | 2,045.2 | 8,182.3 | 5,135.1 | 577.1 | 5,712.2 | 3,725.1 | 9,437.3 | 3,457.3 | 12,894.6 | 1,021.8 | 2,084 |
| 6.1 | Zaire | 1,910.2 | 53.0 | 1,963.2 | 521.5 | 2,484.7 | 75.5 | 2,560.2 | 3,181.4 | 88.4 | 3,269.8 | 448.0 | 3,717.8 | 75.3 | 3,793.1 | 561.3 | 1,041 |
| 6.2 | Central Afr. Republic | 26.2 | 24.4 | 50.6 | 44.4 | 95.0 | 76.3 | 171.3 | 42.6 | 14.4 | 57.0 | 45.1 | 102.1 | 102.6 | 204.7 | 44.1 | 85 |
| 6.3 | Equatorial Guinea | 3.8 | 3.2 | 7.0 | 4.2 | 11.2 | 0.5 | 11.7 | 6.0 | 5.0 | 11.0 | 4.8 | 15.8 | 0.6 | 16.4 | 2.4 | 4 |
| 6.4 | Gabon | 16.3 | 1.3 | 17.6 | 2.0 | 19.6 | 2.7 | 22.3 | 21.9 | 1.7 | 23.6 | 1.9 | 25.5 | 3.0 | 28.5 | 2.7 | 5 |
| 6.5 | Congo | 19.1 | 19.9 | 39.0 | 10.2 | 49.2 | 3.0 | 52.2 | 30.1 | 31.3 | 61.4 | 10.9 | 72.3 | 3.7 | 76.0 | 11.0 | 22 |
| 6.6 | Cameroon | 119.9 | 89.9 | 209.8 | 61.5 | 271.3 | 100.6 | 371.9 | 210.1 | 157.6 | 367.7 | 51.3 | 419.0 | 95.9 | 514.9 | 99.0 | 200 |
| 6.7 | Uganda | 76.2 | 18.3 | 94.5 | 294.6 | 389.1 | 151.2 | 540.3 | 137.9 | 33.2 | 171.1 | 403.3 | 574.4 | 232.7 | 807.1 | 83.1 | 234 |
| 6.8 | Kenya | 661.4 | 17.5 | 678.9 | 1,452.2 | 2,131.1 | 1,333.2 | 3,464.3 | 1,268.8 | 33.4 | 1,302.2 | 2,139.4 | 3,441.6 | 2,457.0 | 5,898.6 | 46.8 | 124 |
| 6.9 | Ruanda | 55.9 | 9.9 | 65.8 | 88.8 | 154.6 | 14.8 | 169.4 | 103.2 | 18.2 | 121.4 | 146.5 | 267.9 | 27.3 | 295.2 | 63.4 | 132 |
| 6.10 | Burundi | 10.9 | 15.8 | 26.7 | 80.9 | 107.6 | 21.4 | 129.0 | 19.4 | 28.1 | 47.5 | 103.7 | 151.2 | 31.7 | 182.9 | 21.0 | 42 |
| 6.11 | Tanzania | 62.1 | 90.5 | 152.6 | 271.1 | 423.7 | 266.0 | 689.7 | 113.7 | 165.8 | 279.5 | 370.2 | 649.7 | 427.7 | 1,077.4 | 87.0 | 184 |
| 7.0 | Southern Africa | 2,453.8 | 778.3 | 3,232.1 | 784.8 | 4,016.9 | 468.2 | 4,485.1 | 4,626.5 | 1,486.1 | 6,112.6 | 973.6 | 7,086.2 | 635.0 | 7,721.2 | 1,158.4 | 2,357 |
| 7.1 | Angola | 76.0 | 31.4 | 107.4 | 129.6 | 237.0 | 64.2 | 301.2 | 136.9 | 56.5 | 193.4 | 158.5 | 351.9 | 90.6 | 442.5 | 124.3 | 259 |
| 7.2 | Zambia | 213.7 | 34.5 | 248.2 | 9.3 | 257.5 | 7.5 | 265.0 | 375.7 | 73.8 | 449.5 | 18.7 | 468.2 | 18.6 | 486.8 | 147.3 | 295 |
| 7.3 | Malawi | 42.7 | 34.3 | 77.0 | 80.5 | 157.5 | 15.9 | 173.4 | 80.9 | 65.0 | 145.9 | 110.7 | 256.6 | 27.3 | 283.9 | 73.9 | 151 |
| 7.4 | Namibia | 44.8 | 9.2 | 54.0 | 12.3 | 66.3 | 48.8 | 115.1 | 72.1 | 14.8 | 86.9 | 11.3 | 98.2 | 44.4 | 142.6 | 23.7 | 47 |
| 7.5 | Botswana | 55.8 | 41.9 | 97.7 | 1.4 | 99.1 | 1.7 | 100.8 | 89.8 | 67.3 | 157.1 | 2.1 | 159.2 | 2.8 | 162.0 | 21.7 | 44 |
| 7.6 | Mozambique | 141.8 | 31.5 | 173.3 | 239.8 | 413.1 | 31.4 | 444.5 | 254.3 | 56.5 | 310.8 | 297.4 | 608.2 | 41.1 | 649.3 | 14.7 | 30 |
| 7.7 | Zimbabwe | 181.6 | 136.1 | 317.7 | 82.2 | 399.9 | 61.5 | 461.4 | 362.8 | 272.1 | 634.9 | 111.8 | 746.7 | 97.1 | 843.8 | 14.9 | 30 |
| 7.8 | Lesotho | 138.4 | 37.4 | 175.8 | 101.3 | 277.1 | 127.2 | 404.3 | 231.2 | 62.2 | 293.4 | 115.3 | 408.7 | 182.8 | 591.5 | 32.8 | 66 |
| 7.9 | Swaziland | 16.4 | 6.7 | 23.1 | 5.6 | 28.7 | 7.7 | 36.4 | 28.6 | 11.7 | 40.3 | 8.0 | 48.3 | 12.5 | 60.8 | 14.0 | 28 |
| 7.10 | S. Africa | 1,542.6 | 415.3 | 1,957.9 | 122.8 | 2,080.7 | 102.3 | 2,183.0 | 2,994.2 | 806.2 | 3,800.4 | 139.8 | 3,940.2 | 117.8 | 4,058.0 | 691.1 | 1,403 |
| 8.0 | Eastern Oceanic Territories | 69.6 | 80.9 | 150.5 | 253.6 | 404.1 | 518.6 | 922.7 | 124.7 | 144.0 | 268.7 | 312.1 | 580.8 | 671.4 | 1,252.2 | 96.3 | 19 |
| 8.1 | Madagascar | 59.0 | 78.7 | 137.7 | 249.9 | 387.6 | 513.6 | 901.2 | 104.9 | 140.0 | 244.9 | 306.7 | 551.6 | 665.0 | 1,216.6 | 93.3 | 18 |
| 8.2 | Comoros | 3.8 | 0.9 | 4.7 | 3.0 | 7.7 | 1.3 | 9.0 | 6.7 | 1.6 | 8.3 | 4.7 | 13.0 | 2.3 | 15.3 | 1.0 | |
| 8.3 | Mauritius | 6.7 | 1.3 | 8.0 | 0.0 | 8.0 | 3.6 | 11.6 | 11.8 | 2.3 | 14.1 | 0.0 | 14.1 | 4.0 | 18.1 | 1.9 | |
| 8.4 | Seychelles | 0.1 | 0.0 | 0.1 | 0.7 | 0.8 | 0.1 | 0.9 | 1.3 | 0.1 | 1.4 | 0.7 | 2.1 | 0.1 | 2.2 | 0.1 | |
| | Total | 17,070.3 | 4,457.7 | 21,528.0 | 9,541.2 | 31,069.2 | 11,122.6 | 42,191.8 | 29,484.1 | 7,650.8 | 37,134.9 | 11,756.4 | 48,891.3 | 15,250.9 | 64,142.2 | 4,946.0 | 10,06 |

Source: UN ECA (1984), unpublished

## C. Sanitation targets

36. The ECA study of 1984 did not include sanitation. However, a comparable analysis has been made in the present study to find out the annual numbers of people that have to be covered if firstly the decade target are to be met by 1990 or 2000 and secondly if the percentages of coverage as at the beginning of Decade were to be maintained by 1990 or 2000. The results are presented in Tables 12a and 12b. From the table it is seen that if the decade objectives (100% coverage) were to be met by 1990, then a total of 49.5 million people would have to be covered every year for the 10 years. This will be made up of 34.1 million in the rural areas and 15.4 million in the urban areas. On the other hand if 100% coverage was to be achieved by 2000 then a total 35.7 million would have to be covered every year. This would have made up of 21.2 million in the rural areas and 14.5 million in the urban areas.

37. In the event that the above rates would not be maintained and it was expected to keep the percentage coverage by 1990 or 2000 the same as at the beginning of the decade then the sanitation coverage up to 1990 would have to be at the rate of 6.5 million people a year (1.5 million in rural and 5.0 million in urban). For the coverage up to 2000 a rate 7.7 million per year (1.6 million in rural and 6.1 million in urban) would have to be maintained.

## D. Sanitation investment requirements

38. Unfortunately it was not possible in both the 1984 and the present studies to assemble data to estimate the investment costs for sanitation under the different scenarios stated above.

TABLE 12a. Estimated annual population to be covered to achieve sanitation target by 1990 or 2000

Target Date 1990

| | Total Pop. | Pop. with 1981 | Pop. without | Total pop. 1990 | Pop. increase 1981-1990 | Total Pop. to be supplied 1981-1990 | ANNUAL RATE OVER 1981-1990 |
|---|---|---|---|---|---|---|---|
| Urban | 135 | 73 | 62 | 227 | 92 | 154 | 15.4 |
| Rural | 334 | 67 | 267 | 408 | 74 | 341 | 34.1 |
| Total | 469 | 140 | 329 | 635 | 166 | 495 | 49.5 |

Target Date 2000

| | Total pop. | Pop. with 1981 | Pop. without | Total Pop. 2000 | Pop. increase 1981-2000 | Pop. to be supplied 1981-2000 | ANNUAL RATE OVER 1981-2000 |
|---|---|---|---|---|---|---|---|
| Urban | 135 | 73 | 62 | 362 | 227 | 289 | 14.5 |
| Rural | 334 | 67 | 267 | 491 | 157 | 424 | 21.2 |
| Total | 469 | 140 | 329 | 853 | 384 | 713 | 35.7 |

TABLE 12b. Estimated annual population to be convered to achieve sanitation targets by 1990 or 2000 the same percentage coverage as in 1981

Target Date 1990

| | Total pop. | % pop. with | Pop. with | Total pop. | Pop. to be supplied in 1990 | Increase in pop to supplied | ANNUAL RATE OVER 1981-1900 |
|---|---|---|---|---|---|---|---|
| | | 1981 | | | 1990 | | |
| Urban | 135 | 54 | 73 | 227 | 123 | 50 | 5.0 |
| Rural | 334 | 20 | 67 | 408 | 82 | 15 | 1.5 |
| Total | 469 | 29 | 140 | 635 | 205 | 65 | 6.5 |
| | | | Target Date 2000 | | | | |
| Urban | 135 | 54 | 73 | 362 | 195 | 122 | 6.1 |
| Rural | 334 | 20 | 67 | 491 | 98 | 31 | 1.6 |
| Total | 469 | 29 | 140 | 853 | 293 | 153 | 7.7 |

Population in millions.

# IV EVALUATION OF ACTUAL PERFORMANCE 1981-1988

39. Since the IDWSSD was launched several evaluations have been carried out. The first was the global evaluation over 1981-1983 carried out by WHO in 1984. Since then there have been evaluations in Abidjan convened by the African Development Bank (ADB) and UNDP in 1985 4/; in Addis Ababa convened by ECA and UNESCO in 1986 5/; and again global evaluations in New York convened by the UN in 1987 and then in Geneva by WHO in 1988.6/

40. The most recent evaluation was that by the WHO which evaluated the situation as at the end of 1988 and estimated the coverages by 1990. The WHO results are presented in Tables 13 and 14.

## A. Performance in Drinking water supply

41. It is seen that for water supply the coverage for the total African population increased from 32% in 1980 to 39% in 1988. This is expected to increase to 41% by end of 1990. In the urban areas the coverage increased from 69% in 1980 to 77% in 1988. This is expected to remain the same by end of 1990 even though the number of people served would have increased by some 10 million people from 1988. In the rural areas the coverage increased from 22% in 1980 to 26% in 1988. This is expected to rise to 27% by end of 1990.

## B. Performance in Sanitation

42. In the area of sanitation the coverage for the total African population increased from 22% in 1980 to 33% 1988. This coverage is expected to reach 34% by the end of 1990. The sanitation coverage in the urban areas rose from 57% to 79% of the urban population in 1980 and 1988. By the end of 1990 the coverage is expected to be 80%. In comparison with the rural areas the coverage for sanitation fell from 20% in 1980 to 17% in 1988. It is expected to fall further to 16% by the end of 1990.

LEVELS OF WATER SUPPLY AND SANITATION SERVICE COVERAGE

TABLE 13a URBAN WATER SUPPLY:
POPULATION COVERED IN DEVELOPING COUNTRIES (EXCLUDING CHINA)

in millions and as percentage of total population by WHO Region

| Region | 1980 (millions) (%) | 1988 (millions) (%) | 1990 Estimate (millions) (%) | 1990 Target (millions) (%) |
|---|---|---|---|---|
| African | 53.109 (69) | 93.667 (77) | 103.806 (77) | 115.166 (85) |
| America | 196.223 (83) | 266.723 (87) | 284.345 (87) | 292.604 (90) |
| South-East Asia | 158.126 (67) | 211.278 (66) | 224.566 (65) | 292.764 (85) |
| Eastern Mediterranean | 92.221 (84) | 137.594 (89) | 148.937 (90) | 162.805 (98) |
| Western Pacific | 48.007 (75) | 63.462 (74) | 67.325 (74) | 82.838 (91) |
| GLOBAL | 547.686 (76) | 772.723 (78) | 828.983 (78) | 946.177 (89) |

TABLE 13b URBAN SANITATION:
POPULATION COVERED IN DEVELOPING COUNTRIES (EXCLUDING CHINA)

in millions and as percentage of total population by WHO Region

| Region | 1980 (millions) (%) | 1988 (millions) (%) | 1990 Estimate (millions) (%) | 1990 Target (millions) (%) |
|---|---|---|---|---|
| African | 43.873 (57 | 95.948 (79) | 108.967 (80) | 113.811 (84) |
| Americas | 174.946 (74) | 248.197 (81) | 266.510 (82) | 253.590 (78) |
| South-East Asia | 68.443 (29) | 109.726 (34) | 120.047 (35) | 265.210 (77) |
| Eastern Mediterranean | 58.187 (53) | 116.828 (76) | 131.488 (79) | 124.596 (75) |
| Western Pacific | 58.888 (92) | 80.307 (94) | 85.661 (94) | 85.569 (94) |
| GLOBAL | 404.337 (56) | 651.005 (66) | 704.643 (66) | 842.775 (79) |

Source: WHO (1988) - Review of progress of the IDWSSD 1981-1990
Eight years of implementation EB83/3

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:bl

TABLE 14a. RURAL WATER SUPPLY:
POPULATION COVERED IN DEVELOPING COUNTRIES (EXCLUDING CHINA)

in millions and as percentage of total population by WHO Region

| Region | 1980 (millions) (%) | 1988 (millions) (%) | 1990 Estimate (millions) (%) | 1990 Target (millions) (%) |
|---|---|---|---|---|
| African | 61.585 (22) | 88.573 (26) | 95.320 (27) | 183.218 (52) |
| America | 51.243 (41) | 59.727 (47) | 61.847 (49) | 64.354 (51) |
| South-East Asia | 255.089 (31) | 513.249 (56) | 577.789 (62) | 610.243 (65) |
| Eastern Mediterranean | 53.812 (31) | 56.336 (28) | 56.967 (27) | 139.434 (67) |
| Western Pacific | 46.353 (41) | 62.003 (50) | 65.916 (52) | 96.048 (76) |
| GLOBAL | 468.083 (31) | 779.888 (46) | 815.942 (49) | 1,093.298 (62) |

TABLE 14b. RURAL SANITATION:
POPULATION COVERED IN DEVELOPING COUNTRIES (EXCLUDING CHINA)

in millions and as percentage of total population by WHO Region

| Region | 1980 (millions) (%) | 1988 (millions) (%) | 1990 Estimate (millions) (%) | 1990 Target (millions) (%) |
|---|---|---|---|---|
| African | 55.986 (20) | 56.786 (17) | 56.985 (16) | 190.265 (54) |
| Americas | 13.748 (11) | 23.919 (19) | 26.462 (21) | 54.260 (43) |
| South-East Asia | 57.601 (7) | 107.206 (12) | 119.607 (13) | 262.874 (28) |
| Eastern Mediterranean | 13.887 (8) | 19.171 (10) | 20.493 (10) | 54.109 (26) |
| Western Pacific | 72.356 (64) | 82.710 (67) | 85.298 (67) | 102.367 (81) |
| GLOBAL | 213.578 (14) | 289.792 (17) | 308.846 (18) | 663.874 (38) |

Source: WHO (1988) - Review of progress of the IDWSSD 1989-1990
Eigh years of implementation.

## C. Comparison of Actual and estimated performance

43. On the basis of the WHO figures, the actual average annual numbers of people covered under both drinking water and sanitation are compared first with the projected numbers that had to be covered to attain the objectives of the decade by 1990 or 2000, and secondly with the projected annual numbers if the percentage coverage in 1980 were to be maintained by 1990 or 2000, as presented in Table 8. The comparative analysis (actual against estimated are presented in Tables 15a and 15b and in Figs 4 and 5.

### 1. Drinking water supply coverage

44. The comparison in the case of drinking water supply shows that the annual rate of coverage over the 1981-1988 period is only 18% and 25% of the rate projected to meet the decade objectives by 1990 or 2000 respectively. The rural coverage is the worse of the two. The actual progress is only 10% and 16% of the rate required to meet the objectives by 1990 or 2000 respectively. On the other hand it is twice the projected rate to make the percentage coverage by 1990 or 2000 the same as in 1980. Overall (urban and rural) on current performance 1990 and 2000 will be reached with either the same or marginal improvement in the percentage coverages prevailing in 1980.

### 2. Sanitation coverage

45. On the Sanitation side the comparison shows that the average annual rate of coverage over the 1981-88 period is 13% and 18% of the rate projected to meet the decade objectives by 1990 or 2000 respectively. The rural coverage is again worse, as the actual progress is only 0.3% and 0.5% of the rate required to meet the objectives of the decade by 1990 or 2000 respectively. What is even more disconcerting is that it is only 6% of the rate required to attain a percentage coverage by 1990 or 2000 the same as the percentage coverage in 1980. The situation is therefore worsening for the rural areas. Again taken overall (urban and rural) if the current rate of progress is maintained, 1990 or 2000 will be reached with a percentage coverage the same as was in 1980.

TABLE 15a. Comparism of projected rate of coverage to attain objectives of drinking water supply and actual performance

| | Projected achievement by 1990 or 2000 vrs actual Performance | | | | | Coverage by 1990 or 2000 same as % in 1981 vrs Actual performance | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 Projected top/yr (million) | 2000 Projected pop/yr. (million) | Actual pop./yr covered 1981-88 (million) | % of 1990 projection | % of 2000 projection | 1990 projected pop/yr (million) | 2000 projected NO/yr(million) | Actual pop/yr covered 1981-88 (million) | % of 1990 projected | % of 2000 projection |
| Urban | 13.5 | 13.4 | 5.0 | 37 | 37 | 5.9 | 7.3 | 5.0 | 84.7 | 68.5 |
| Rural | 33.2 | 20.8 | 3.4 | 10 | 16 | 1.7 | 1.7 | 3.4 | 200.0 | 200.0 |
| Total | 46.7 | 34.2 | 8.4 | 18 | 25 | 7.6 | 9.0 | 8.4 | 110.5 | 93.3 |

TABLE 15b. Comparism of projected rate of coverage to attain objectives of Sanitation and actual performances

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Urban | 15.4 | 14.5 | 6.5 | 42 | 45 | 5.0 | 6.1 | 6.5 | 130.0 | 106.6 |
| Rural | 34.1 | 21.2 | 0.1 | 0.3 | 0.5 | 1.5 | 1.6 | 0.1 | 6.7 | 6.0 |
| Total | 49.5 | 35.7 | 6.6 | 13 | 18 | 6.5 | 7.7 | 6.6 | 101.5 | 85.7 |

Fig. 4a Comparism of Actual performance with estimated performance to achieve objectives by 1990 or 2000

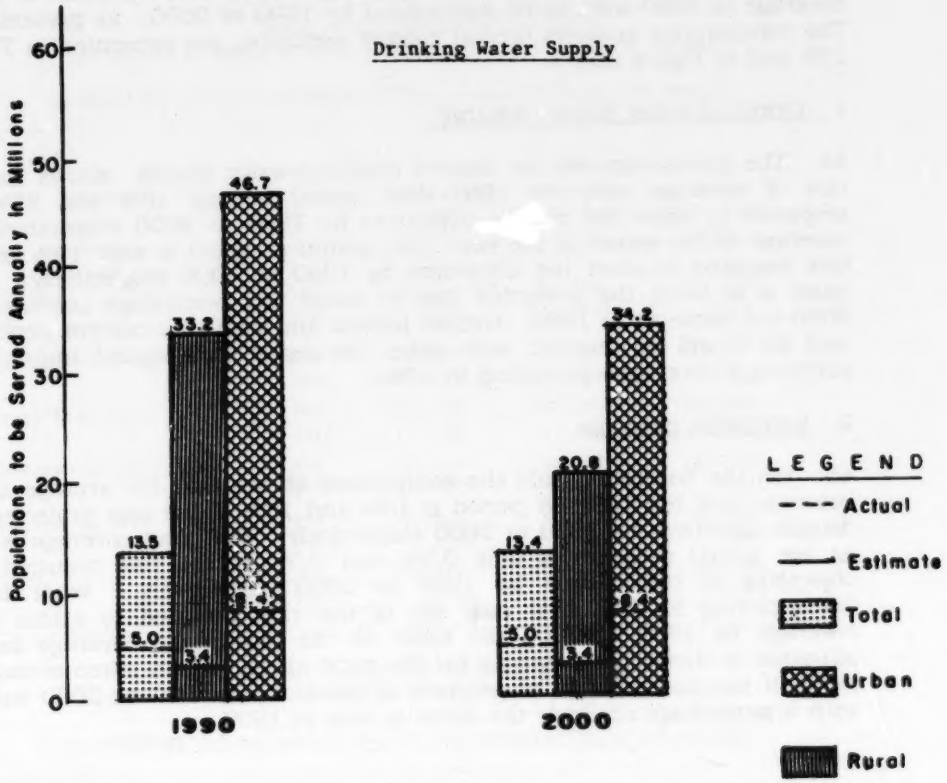
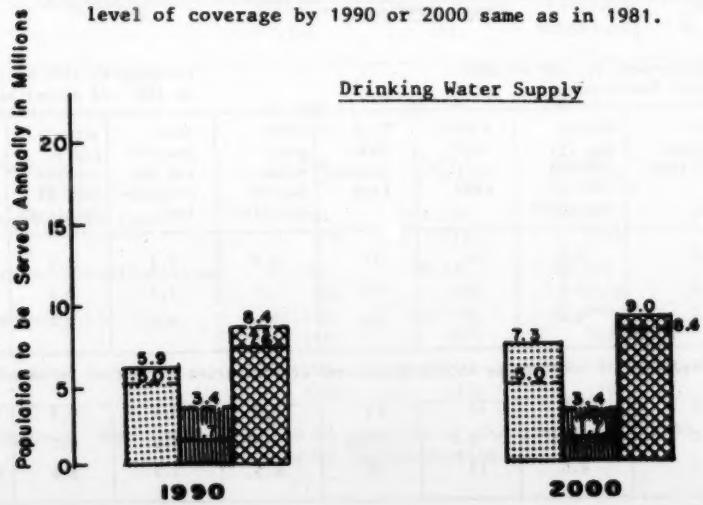



Fig. 4 b Comparism of actual performance with estimated performance to achieve level of coverage by 1990 or 2000 same as in 1981.



5a

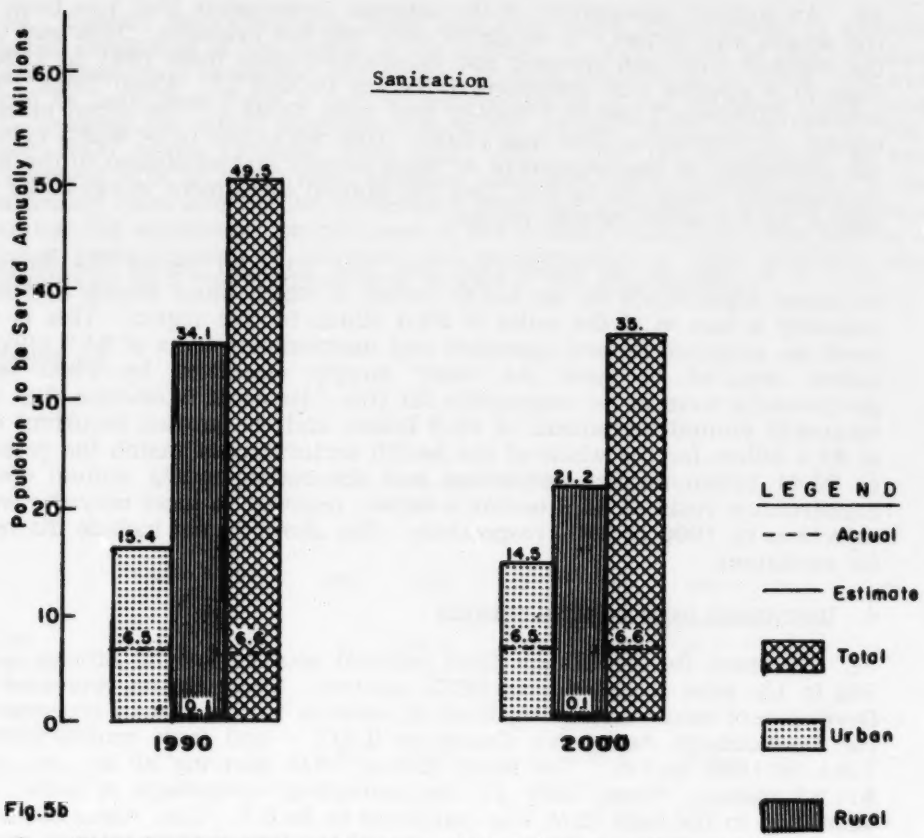
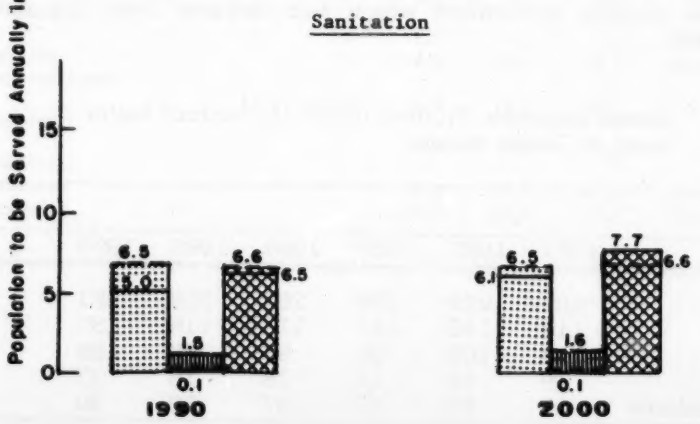



Fig.5b

Comparism of Actual performance with estimated performance to achieve level of coverage by 1990 or 2000 same as in 1981



3. Estimated actual investment

46. An indirect assessment of the internal investments that has been made over the period was carried out as direct data was not available. This was based upon the regional GDP and revenue and expenditure data from 1981 to 1986 extracted from ECA sources and presented in Tables 16 and 17. From Table 16 the mean annual GDP was US$273.3 billion; and from Table 17 the mean annual ratio of capital expenditure to GDP was 14.0%. This works out to be $38.3 billion. Taking the percentage of the investment in water supply and sanitation to the total annual development budget to be 6%, then the annual investment works to be about $2.3 billion, for the whole African region.

47. It is also to be noted that over the 1981-86 period the average annual recurrent expenditure on the health sector of which water supply and sanitation is assumed a part is of the order of $3.3 billion for the region. This is not able to meet the projected annual operation and maintenance costs of $4.9 billion or $10.1 billion required to meet the water supply objectives by 1990 or 2000, if governments were to be responsible for this. Hence it is obvious that the present estimated annual investment of $2.3 billion and the annual recurrent expenditure of $3.3 billion for the whole of the health sector cannot match the projected $4.22 or $6.41 billion annual investment and the corresponding annual operation and maintenance costs of $4.9 or $10.1 billion required to meet only the water supply objectives by 1990 or 2000 respectively. The above do not include the requirements for sanitation.

4. Investment from external sources

48. To asses the investment from external sources for the African region Tables 18a to 18c were compiled from OECD sources. These figures represent the Official Development Assistance (ODA) from all sources to the African countries - viz from the Development Assistance Countries (DAC) - and from multilaterals) over the 1981 to 1986 period. The mean annual ODA covering all sectors amounted to $11.83 billion. From Table 19 the percentage component of water supply and sanitation in the total ODA was computed to be 6.7. This works out to be $0.781 billion which represents the average annual investment from external sources in the water supply and sanitation sector over the 1981-86 period. This external component is 34% of the total annual investment of $2.3 billion in the water supply and sanitation in the African region. This does not compare favourably with the average of 75% of total investment which was deduced from the national plans prepared in 1980.

**Table 16:** Gross Domestic Product (GDP) (At current factor cost) in billion dollars

| | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | Mean 1981-86 |
|---|---|---|---|---|---|---|---|
| Africa | 289 | 279 | 286 | 264 | 259 | 281 | 273.3 |
| Northern | 118 | 116 | 117 | 116 | 118 | 131 | 119.3 |
| Western | 113 | 105 | 96 | 93 | 88 | 89 | 97 |
| Central | 19 | 19 | 18 | 18 | 18 | 22 | 19.0 |
| Eastern & Southern | 38 | 39 | 37 | 37 | 36 | 39 | 37.7 |

Source UN ECA: Survey of Economic and Social conditions in Africa (1985-86 & 1986-87)

## D. Social and Economic conditions over 1981-1988

49. Despite the constraints there has been some improvement in aspects of the social conditions of the people in the region. The provision of good drinking water and satisfactory sanitation can be said to have contributed to them. For instance it can be seen from Table 3 that an indirect result of the progress made, contributed to lowering the infant mortality rate in the African region from 122 to 102 deaths per 1000 births between 1981 and 1986. The life expectancy at birth also improved from 48 to 50 years between 1980 and 1985. Improvements in the infant mortality rates and the life expectancy were also recorded in all the subregions. Of course the significant contributions of the Primary Health Care Programme with the mass immunization of children and improvement in child nutrition should be mentioned as a major contributing factors to the improvements.

**Table 17**

MAJOR FISCAL INDICATORS ON DEVELOPING AFRICA %
(Weighted average)

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | Mean 1981-1988 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ratio revenue/GDP | 27 | 31 | 24 | 25.2 | 26.9 | 25.4 | 26.3 | 28.0 | 25.0 | 26.5 |
| Proportion of current revenue contributed by indirect taxes | 36 | 50 | 46 | 48.7 | 33.3 | 40.4 | 43.3 | 44.2 | 44.9 | |
| Taxe on international trade | 35 | 42 | 29 | 22.8 | 14.0 | 25.8 | 24.0 | 22.7 | 32.7 | |
| Ratio total expenditure/ GDP | 22 | 33 | 36 | 34.5 | 35.2 | 33.8 | 35.0 | 34.6 | 29.8 | 34.8 |
| Ratio current expenditure/ GDP of which proportion for: | | | | | | | | | | |
| Education | 12 | 20 | 20 | 16.5 | 15.9 | 19.3 | 21.4 | 20.8 | 9.9 | |
| Health | 5 | 8 | 9 | 4.9 | 4.0 | 4.4 | 5.2 | 5.1 | 4.1 | 5.9 |
| Agriculture | 2 | 3 | 2 | 4.2 | 3.5 | 2.1 | 2.8 | 6.5 | 8.7 | |
| Transport and communication | 3 | 5 | 5 | 3.2 | 1.3 | 1.6 | 1.4 | 3.7 | 4.1 | |
| Public debt service | | | | 18.8 | 20.4 | 37.3 | 33.3 | 27.2 | 33.7 | 27.5 |
| Ratio capital expenditure/ GDP | 11 | 15 | 15 | 14.0 | 14.4 | 12.7 | 13.0 | 12.8 | 10.9 | 14.8 |
| Ratio overall deficit/ GDP | 1 | 6 | 11 | 9.3 | 6.9 | 8.0 | 9.2 | 6.8 | 5.3 | 8.4 |
| Proportion of deficit: | | | | | | | | | | |
| Externally financed | | | | 37.9 | 33.1 | 40.9 | 29.6 | 52.0 | 52.4 | 35.4 |
| Internally financed | | | | 62.1 | 66.9 | 59.1 | 70.4 | 48.0 | 47.6 | 64.6 |

Sources UN ECA: Survey of Economic and Social conditions in Africa (1981/82-1986/87)

**Table 18: Net Disbursements of Official Development Assistance (ODA) from multi-lateral and bilateral (Development Assistance Countries - DAC) Sources to Africa**

| | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|---|---|---|---|---|---|---|---|
| Net disbursements of ODA from all sources combined to individual recepients | | | | | | | |
| Africa | 10957.3 | 11089.3 | 10942.2 | 10364.2 | 11394.9 | 12884.1 | 14305.0 |
| North of Sahara | 2709.1 | 2744.2 | 2557.1 | 2180.0 | 2428.7 | 2958.9 | 2378.1 |
| South of Sahara | 8076.6 | 8137.9 | 8174.0 | 7962.3 | 8226.3 | 9536.1 | 11518.8 |
| Africa unspecified | 171.6 | 207.3 | 211.1 | 221.8 | 739.9 | 389.1 | 408.1 |
| TABLE 18b. | | | | | | | |
| Net disbursements of ODA by multilateral agencies to individual recepients | | | | | | | |
| Africa | 2749.6 | 2808.3 | 2689.2 | 2733.0 | 2870.1 | 3436.7 | 4020.0 |
| North of Sahara | 311.0 | 335.0 | 331.8 | 387.7 | 240.5 | 258.2 | 194.1 |
| South of Sahara | 2409.3 | 2397.8 | 2278.9 | 2255.8 | 2523.9 | 2976.6 | 3614.0 |
| Africa Unspecified | 29.3 | 75.6 | 78.5 | 89.6 | 105.7 | 201.9 | 211.9 |
| TABLE 18c. | | | | | | | |
| Net Disbursements of ODA by DAC countries combined to individual recepients. | | | | | | | |
| Africa | 6823.0 | 6863.0 | 6997.8 | 6846.8 | 7515.9 | 8415.3 | 9777.1 |
| North of Sahara | 1663.0 | 1624.3 | 1759.9 | 1715.4 | 2156.0 | 2278.9 | 2132.9 |
| South of Sahara | 5017.7 | 5110.0 | 5105.4 | 4999.1 | 5216.1 | 5949.1 | 7482.1 |
| Africa unspecified | 142.3 | 128.7 | 132.6 | 132.3 | 143.8 | 187.2 | 162.1 |

Sources OECD (1988) - Geographical Distribution of financial flows to Developing countries.

**Table 12: Estimates of external financial support for Drinking water supply and Sanitation**

US$ Millions

| | 1970 - 1979 | 1980 | 1981 | 82/83 |
|---|---|---|---|---|
| Bilaterals | 2,419.0 | 715.3 | 803.5 | |
| Banks and funds | 2,200.0 | 450.0 | 500.0 | |
| World Bank | 2,850.0 | 631.0 | 641.5 | |
| United Nations | 370.0 | 145.0 | 150.0 | |
| NGO's | 200.0 | 140.0 | 150.0 | ------- |
| TOTAL | 8,039.0 | 2,081.3 | 2,195.0 | |
| % of WSS to all ODA. + | | 6.2% | 6.7% | 6.9% * |

+ OECD (1988) - Geographical Distribution of Annual flows to Developing Countries.

* OECD (1985) Table III Pp.III 25 arts of Development Cooperation.

After WHO (1983) cataloque of external support - IDWSSD

50. On the economic side the GDP per capita annual growth rates for 1980 to 1986 were generally negative for the whole African region and its subregions except the North African subregion which recorded positive growth rates in four out of the six years (Table 4). It must not be forgotten that the period under review was also the period of the great African drought. As can be expected therefore the contribution of Agriculture to the GDP remained generally at about 22%, except in 1986 when it rose to 24%. Similar trends occurred in the subregions as shown in Table 6. The recovery of African agriculture in 1985 and 1986 was not sustained in 1987, because of bad weather (long dry spells and late rain). 7/ Also the economically active population engaged in agriculture fell from 71% to 68% between 1981 and 1986. This trend is expected to continue in the future. This loss to the urban areas shown in the increasing urbanization in Table 2 can be attributed among other things to the harsh rural conditions, including the absence of adequate good drinking water.

51. The fact that by the end of the Decade less than a third of the rural population in the African continent would have access to safe drinking water supply (increased only from 22% to 27%) and that the coverage with sanitation facilities would have declined from 20% to 16% shows the impact of population growth and overall gives cause for considerable concern.

52. A few points need to be made about some of the data used in the analysis. The first relates to the population figures. There are discrepancies in the population estimates between those of ECA, and those of WHO. Further WHO estimates for specific years made at various times also contain discrepancies. Differences are also evident in comparison with the UN population estimates. It may appear that these differences arise from the states that are considered by ECA, WHO and the UN as their member States in the African region. Some work is therefore required to reconcile these estimates, so as to establish consistent figures for the total urban and rural population that have been provided with good drinking water and sanitation facilities. Secondly, the cost figures have been arrived at indirectly and more direct cost data need to be compiled. The estimates so far are however useful for comparison. Thirdly the results reflect average conditions for the region. Subregional differences, and also variations within the countries have not been accounted for.

53. In this section a number of issues that affected the implementation of the decade programme in the African region are identified and discussed.

## A. Linkages of sector plans with national development plans

54. One of the things which was very noticeable with the plans prepared by the countries of the region, was that the performance trends in the 1971-1980 decade were not analysed, for lessons to be drawn from them as a guide to planning for the 1981-1990 decade. This might have partly been contributed by the euphoria with which the decade was launched. It must have been felt that vast financial resources would become available both internally and externally to make possible the achievements of the objectives of the decade by 1990. The level of absorptive capacities in the terms of capable manpower, financial resources and managerial competence which had been built up in the various countries as a result of the actual performance trends in the 1970s were almost forgotten. As such decade plans were drawn up which were not related to the capacities of the countries to implement. All this happened in spite of the fact that in the rapid assessment which WHO carried out on the prepareness of the countries in the region to implement the decade about 75% of the countries had indicated that they lacked finance and were deficient with regard to sector planning, mobilization of finance, project planning, and sector management 1/.

55. As a consequence of the above the preparatory documents did not indicate the part of the Gross Domestic Product or of the total national investment over the planning period of the 1980s that governments were going to devote to the implementation of their water supply and sanitation programmes. Further, while external investment was expected the available information did not show that any policies had been formulated with respect to the conditions under which external funding would be accepted in cases of, loans, interest rates, moratorium periods, repayment periods, grants and impact of loans on balance of payments and debt service situation etc.

56. Again there were no indications in the reports as to the economic and financial objectives which were required to be followed by the agencies and bodies charged with provision of water supply and sanitation. Whether the urban areas would have different objectives from the rural areas was not indicated. Consequently the cost of water or sanitation service and its recovery, having regard to incomes in the urban and rural areas respectively were not discussed. What appears evident was that the IDWSSD was entered into with about the same economic and financial policies as existed at the beginning of the decade. Whether those policies would be applicable in the 1981-1990 period did not appear to have been analyzed.

57. Further there were no clear positions with regard to how to make investments in the sector sustainable. While there were scattered information about tarrifs and about subsidies being paid by governments for the cost of operation and maintenance in both urban and rural areas no clear positions had been formulated as to how and who will be responsible for the operation and maintenance costs if the existing and expanded systems were to continue functioning to deliver the services required of them. It was evident that the lack of policies on the above

issues were to pose great problems to the sector even before the half way period of the decade was reached.

58. With regard to sector plans a number of countries had prepared water master plans at the beginning of the decade covering the sectors of agriculture, health, industry, energy navigation and so on. They had assessed the available water resources and how these could be used to meet the water demand in the various sectors. For the water and sanitation sector various projects had been identified mainly to expand the coverage of drinking water supply and sanitation in the urban and rural areas.

59. The plans included installation of new systems, rehabilitation and expansion of existing ones, and completion of on-going projects. These are normally perspective plans whose accomplishment will take many years-25 years or more to realise. On the other hand the national development plans are normally of 3 ,to 5 years duration. It is therefore obvious that they cannot accommodate all the projects which will take as many as 25 years or more to complete. Experience shows that the national development plans were loaded with projects which could not be accomplished in the plan periods. This contributed in serious problems for project planning and execution later on. To avoid creating much problem a means must be established to prioritise the projects in the sector plans so that a manageable number can be selected for inclusion in the national development plan periods and thereby effectively link the macro economic plans with the sector plans. Among the criteria that should be considered, are the emphasis given to rural and urban water supply in the plan period, and secondly the emphasis attached to new projects vis a vis strengthening existing coverage through rehabilitation and expansion of existing systems, and the completion of on-going projects. A third criteria needing consideration is the eradication of water-borne water-related and water-associated diseases in known parts of the country, particularly in the poorer agricultural and semi-urban areas.

60. Eventually a dominant consideration should be given to whether the estimated cost of the projects selected for the water supply and sanitation sector can be financed from the investment level allocated in the overall national development plan at the macro-level to the sector.

## B. Population growth and the African economy

61. The earlier analysis has shown that at the present rate of progress the objectives of the Decade cannot be achieved by 1990 neither can they be achieved by 2000 if greater efforts are not made and more resources mobilised. In the case of drinking water the same percentage coverage as attained by 1980 is likely to be maintained by 2000. On the sanitation side there will be a decrease in the percentage coverage in 2000 as compared with 1980.

62. On the investment side it is also shown that tentative though the investment and operation and maintenance cost estimates are, they provide an order of magnitude which also indicates that more resources are needed. The prospects as to whether more financial resources could have been allocated to the decade both from internal and external sources were assessed from data on the African economy and Official Development Assistance (ODA) from both bilateral and multilateral sources, respectively.

### 1. Impact of population growth

63. The population growth rates are shown in Table 1. Though the GDP has remained fairly constant over the 1981-86 period as shown in Table 16, its effect on GDP per capita has been adverse as shown in the annual growth rates per

1981. In the case of sanitation Fig. 5b shows a similar trend. Hence a high population growth rate in the region has absorbed any improvements in the coverage that could have been attained.

2. Revenue and expenditure stagnation

64. It can be observed from Table 17 that total expenditure of African countries have exceeded total revenue over the 1981-86 period by about 8% per annum. There has been practically no growth in the total recurrent expenditure nor in the capital expenditure. Improvement in the GDP was not to be expected as the prices of African primary commodities over the period fell on the world market. In total there was an accumulated fall in earnings of $89.7 billion over the 1981-1987 period as shown in Table 20.

65. On the other hand the fall in prices of imports over the same period meant an accumulated gain of $44.4 billion to national economies. The overall loss to the national economies was $45.3 billion. As the capital expenditure/GDP ratio over 1981-1988 (Table 17) is about 14.8% this meant a loss of US $ 6.7 billion over 1981-87. If the ratio of investment in the water supply and sanitation to total investment is taken as 6% then the loss of investment to the region was US$ 0.057 billion per annum. Hence the mounting debt which is shown in Table 21 deprived the sector of sizeable trends. The Debt/GDP ratio rose from 57% in 1984 to 70% in 1987. Also the Debt Service ratio for the region rose from 27.6 in 1984 to 35.8% in 1987 with a peak of 42.7% in 1986. It was therefore clear that flows of external resources in the form of loans for the sector worsened the debt service obligations, and governments therefore had to be cautious.

3. Impact of Structural Adjustment Programmes

66. Because of the imbalances in both the internal and external accounts of countries in the region coupled with the drought the economies of the countries have been in crisis over the period of the decade.

67. In the attempt to bring about some order they have been forced to accept Structural Adjustment Programmes (SAP) as a condition to get assistance from the IMF to balance both the external and internal accounts. The SAP packages have included massive devaluation of currencies, reduction in imports and government expenditures and reduction or removal of subsidies.

68. The SAP packages have had adverse effects on the water supply and sanitation sector. Among these may be mentioned:-

(i) Reduction of sector investment because of reduction of total investment funds,

(ii) the local currency component of the investment have escalated. In cases where governments have been responsible for all or part of the foreign currency costs they have had to pay more local currency,

(iii) On the operation and maintenance side costs have gone up because devaluation has pushed up costs of assets spare parts, fuels, chemicals, transport, wages, etc.

**Table 20: Impact of the Fall in Prices on Developing Africa's Trade**
(in $ billion)

| | 1984 | 1985 | 1986 | 1987 | Cumulative 1981 - 1987 |
|---|---|---|---|---|---|
| **Developing Africa** | | | | | |
| Exports | -11.7 | -15.2 | -32.7 | -15.6 | -89.7 |
| Imports | 11.2 | 7.0 | 5.2 | 2.3 | 44.4 |
| Overall loss | -0.5 | -8.2 | -27.5 | -13.3 | -45.3 |
| **Sub-Sahara** | | | | | |
| Exports | -4.0 | -5.1 | -6.8 | -8.0 | -33.4 |
| Imports | 3.4 | 2.2 | 2.2 | 0.9 | 15.0 |
| Overall loss | -0.6 | -2.9 | -4.6 | -7.1 | -18.4 |

Source: ADB/ECA (1988): Economic Report on Africa 1988.

a/ (-) sign indicates loss and a (+) indicates a gain if 1980 prices are assumed to prevail.

b/ Excluding Nigeria.

**Table 21: Debt and Debt Service of Developing Africa**
(values in billions of dollars)

| | 1984 | 1985 | 1986 | 1987 a/ |
|---|---|---|---|---|
| Total debt | 152.1 | 174.4 | 207.7 | 218.1 |
| Sub-Sahara | 80.6 | 95.5 | 117.4 | 118.1 |
| North Africa | 71.5 | 78.9 | 90.3 | 100.0 |
| Debt Service | 21.7 | 24.3 | 26.4 | 26.5 |
| Sub-Sahara | 9.9 | 12.0 | 13.7 | 13.8 |
| North Africa | 11.8 | 12.3 | 12.7 | 12.7 |
| Ratios | | | | |
| Debt/GDP | 0.57 | 0.67 | 0.74 | 0.7 |
| Debt/exports | 1.94 | 2.14 | 2.98 | 2.9 |
| Debt service ratio | 27.6 | 29.3 | 42.7 | 35.8 |
| Sub-Sahara | 26.1 | 29.3 | 42.9 | 47.3 |
| North Africa | 29.1 | 30.4 | 38.5 | 28.9 |

Source: ADB/ECA (1988). Economic Report on Africa 1988.

a/ Preliminary

(iv) Because of the reduction or removal of subsidies for operation and maintenance the water and sanitation authorities have not been able to meet their obligations to consumers with the result that:

a) systems have been inadequately maintained and capital has consequently been badly run down,

b) water delivery services have been poor and consumers have refused to pay the limited tariffs expected of them, thus making the financial position of the water and sanitation authorities worse. In a number of cases this has led to complete collapse of system and communities have reverted to their polluted sources of supply. The national economies have been losing because very scarce resources have been invested which are yielding no returns whatsoever.

c) a vicious circle has, therefore, resulted in which tariffs should be increased to reflect the cost of delivery of drinking water and sanitation services, and the consumers also refusing to pay for lack of satisfactory service.

69. The adjustments in levels of funding investments and operation and maintenance costs under the SAP, will establish new equilibrium levels and these should be used in planning programmes for the 1990s.

70. It could be argued that taxes (direct and indirect) could have been raised as a means of mobilizing additional funds. With the SAP calling for reduction of imports to improve balance of payments situation, the possibilities of mobilising funds from increased indirect taxation and also taxes on international trade have been limited. It is seen from Table 17 that these have remained fairly stable percentages of the GDP. With regard to direct taxation the possibilities have equally not been good. This is because with inflation and massive devaluations under SAP the purchasing power of workers in most countries have been seriously eroded and it is not possible to tax them further without serious political consequences.

4. Inflow of external funds

71. It has been difficult to assemble direct data on the flow of external investments funds that have come into the region for the sector. Indirect assessment has therefore been made. First data is presented in Tables 18a, b and c on the net disbursements of Official Development Assistance (ODA) from all sources combined (multilateral and bilateral) and separately from multilateral and from bilaterals 8/. Next the trends in financial resources allocation from the UN system (1973-85) and from the World Bank and the IDA (1976-85) respectively for the IDWSSD are presented in Figs 6 and 7.9/

72. For funding that came from bilateral sources reference is made to Table 18c. It must be noted that the data in the table refers to disbursement for all sectors to the countries of the region. The percentage that was allocated to the water supply and sanitation sector is deduced from Table 22. 10/ From Table 18c it is noted that assistance to the Africa region increased from 1981 to 1982 then decreased in 1983 and thereafter increased steadily to 1986. The estimated percentage of the water supply and sanitation component of the resources for 1982/83 as indicated in Table 22 was 6.9. The average for 1981-1983 was 6.7% as shown in Table 19. With regard to the growth in aid from the Development Assistance Countries (DAC) to the whole region, Table 23 shows that there was a general growth in aid of about 3.6% over the period 1970/71-1983/84. Also the aid to GNP ratio increased from 0.34 in 1970/71 to o.36 in 1983/84 as shown in the same table. On the other hand the percentage of aid to central government expenditures of DAC over the

1970-83 period was fairly stable as shown in Table 24. It can be deduced from the above that if the present percentage of total aid for water supply and sanitation (approx 6.7) is maintained then slight increases in the volume of aid to the sector could be expected. This increase will depend of course on the continued growth of the GNP in the DAC countries.

73. For the UN system, Fig 6 shows that there was an increase in the funds allocated to the Decade from 1981 to 1983. After that allocations have steadily been decreasing. With respect to the World Bank and IDA, funding of projects in Africa South of the Sahara increased steadily from 1981-1984. Thereafter, it fell slightly in 1985. For Africa North of the Sahara there was a steady rise in investment from 1981 to 1983. There was a fall in 1984, but picked up again in 1985.

74. Overall it can be concluded that firstly because of the African economic difficulties over the 1980s it has not been possible for internal investment and operation and maintenance funds to be increased beyond the levels of the 1970s, secondly there has been a reduction in the flow of external funds from the UN system and thirdly the resources from bilateral or DAC have remained practically unchanged.

## C. Bankability of Projects

75. In previous sections the problems posed by ineffective sector plans that are properly linked with national development plans at the macrolevel were discussed. An equally serious problem that has plagued the governments and the national water and sanitation authorities is the linkage of the sector plans with the various projects that are prepared at the micro-level and submitted for funding. Invariably national development and sector policies are not clearly reflected in the projects submitted and as such funding agencies particularly external ones, find it difficult to have a basis for committting funds. Simply the projects have not been bankable. Long delays are therefore experienced in the attempt to establish the technical, economic and social worth of projects. These delays have partly accounted for the low rate of progress achieved.

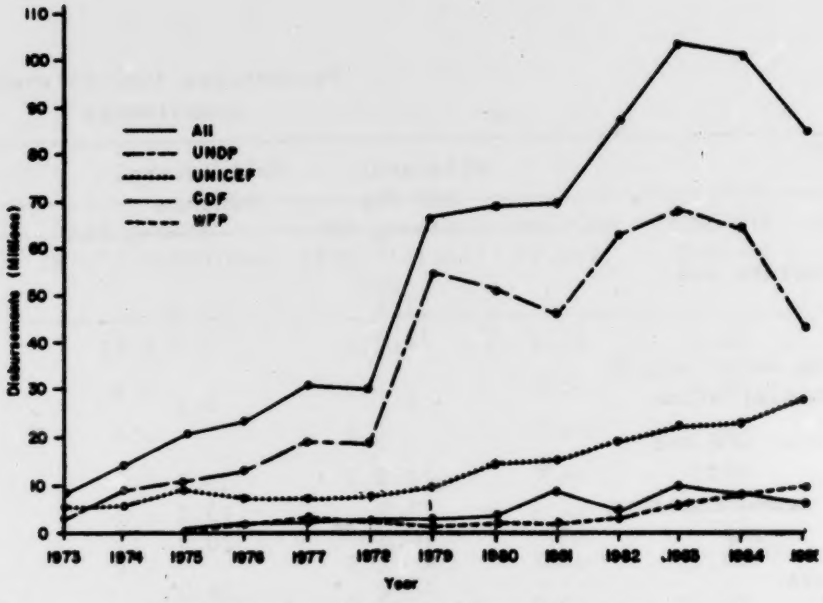



Fig. 6. UN system disbursements for drinking water supply and sanitation

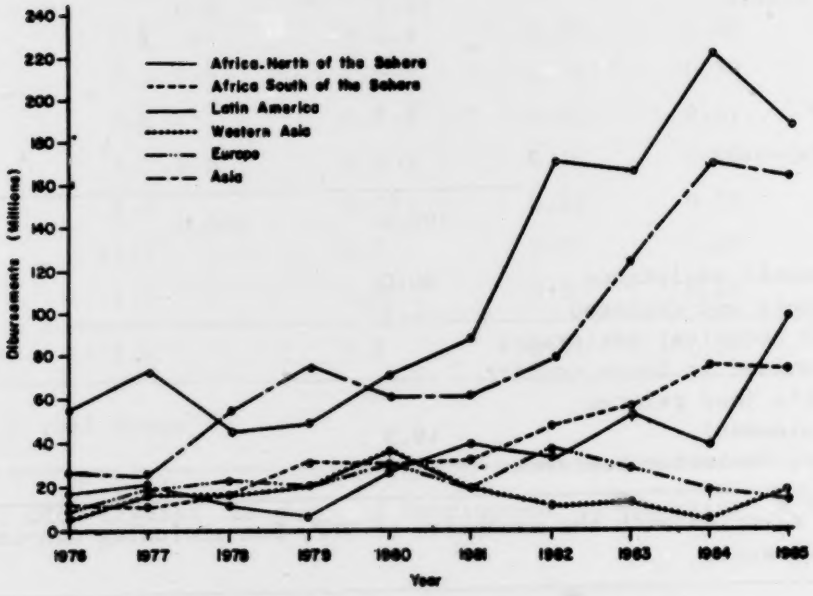



Fig. 7 World Bank and IDA loans and credits for drinking water supply and sanitation (by region, 1976-85)

**Table 20: The Major Uses of Official Development Finance**

| | Percentages 1982-83 averages commitments | | |
|---|---|---|---|
| | Bilateral DAC ODA | Multilateral Finance | Total |
| Social infrastructure and services.. | 22.1 | 15.9 | 19.3 |
| Education | 12.0 | 5.1 | 8.8 |
| Other including water supply and public administration | 4.7 | 9.9 | 6.9 |
| Economic infrastructure and services | 21.3 | 33.3 | 26.8 |
| Transport and communications | 10.9 | 13.2 | 12.0 |
| Energy | 10.4 | 20.1 | 14.8 |
| Production sectors | 27.2 | 36.8 | 31.6 |
| Agriculture | 12.1 | 23.0 | 17.1 |
| River development and other productive sectors | 8.0 | 12.6 | 10.2 |
| Non-project assistance | 20.4 | 14.0 | 17.3 |
| Financial assistance | 12.5 | 8.9 | 10.7 |
| Debt relief | 1.0 | - | 0.5 |
| Food aid | 6.9 | 5.1 | 6.1 |
| Aid through NGOs | 5.3 | - | 2.9 |
| Administrative expenses | 3.7 | n.a. | 2.1 |
| Total | 100.0 | 100.0 | 100.0 |
| of which: Technical assistance | 30.0 | | |
| Students and traineed | 4.1 | | |
| Other technical assistance provided in donor country | 2.6 | | |
| Experts (and related equipment) | 19.5 | | |
| Other, including research | 3.8 | | |

a) Excluding UN agencies with the exception of WFP, but including non-concessional development finance.

Source: OECD (1985) 25 years of development co-operation - A Review.

**Table 22: ODA and GNP in DAC Countries**

| | Percentages | | | | |
|---|---|---|---|---|---|
| | Aid growth 1970/71-1983/84a | GNP growth 1970/71-1983/84a | ODA/GNP 1970-71 | ODA/GNP 1984-84 | GNP per capital 1983-1984 $ |
| Norway | 13.3 | 3.8 | 0.33 | 1.04 | 13,070 |
| Netherlands | 6.2 | 2.4 | 0.60 | 0.96 | 8,880 |
| Sweden | 8.0 | 2.0 | 0.40 | 0.82 | 10,910 |
| Denmark | 7.5 | 2.0 | 0.40 | 0.79 | 10,480 |
| France | 3.7 | 2.9 | 0.68 | 0.75 | 9,190 |
| Belgium | 3.7 | 2.3 | 0.48 | 0.58 | 8,040 |
| Canada | 4.4 | 3.2 | 0.41 | 0.48 | 12,820 |
| Australia | 1.5 | 3.2 | 0.59 | 0.47 | 10,460 |
| Germany | 4.8 | 2.1 | 0.33 | 0.47 | 10,360 |
| Finland | 14.6 | 3.3 | 0.09 | 0.34 | 9,820 |
| Japan | 7.5 | 4.2 | 0.22 | 0.34 | 9,990 |
| United Kingdom | 0.3 | 1.8 | 0.42 | 0.34 | 7,860 |
| Switzerland | 7.8 | 0.5 | 0.12 | 0.31 | 15,270 |
| Italy | 7.2 | 2.3 | 0.16 | 0.28 | 6,110 |
| New Zealand | 3.9 | 2.7 | 0.12 | 0.27 | 6,800 |
| Austria | 13.5 | 3.0 | 0.07 | 0.26 | 8,660 |
| United States | 1.2 | 2.6 | 0.30 | 0.24 | 14,830 |
| Total DAC | 3.6 | 2.9 | 0.34 | 0.36 | 11,240 |

a) Annual rates in real terms

Source. OECD (1985): 25 years of Development Co-operation. A Review.

**Table 24: ODA Appropriations as percentage of Central Government Budget Expenditures 1970 - 83**

| Australia | Fiscal years three yrs averages) | | | |
|---|---|---|---|---|
| | 1970-72 | 1975-77 | 1978-80 | 1981-83 |
| Australia | 2.2 | 1.6 | 1.5 | 1.5 |
| Austria | 0.3 | 0.4 | 0.4 | 0.4 |
| Belgium | 1.9 | 1.9 | 1.7 | 1.4 |
| Canada | 2.8 | 2.3 | 2.3 | 2.1 |
| Denmark | 1.5 | 1.9 | 1.9 | 2.0 |
| Finland | 0.6 | 0.6 | 0.7 | 1.1 |
| France | 3.6 | 3.3 | 3.1 | 3.1b |
| Germany | 2.3 | 2.1 | 2.4 | 2.5 |
| Italy | - | - | 0.6a | 1.0 |
| Japan | 1.9 | 1.8 | 2.0 | 2.1b |
| Netherlands | 2.6 | 2.7 | 3.1 | 3.0 |
| New Zealand | 0.7 | 0.9 | 0.7 | 0.6 |
| Norway | 1.4 | 2.5 | 2.7 | 2.4 |
| Sweden | 2.2 | 2.7 | 2.5 | 2.5 |
| Switzerland | 1.9 | 1.9 | 2.2 | 2.6 |
| United Kingdom | 1.8 | 1.5 | 1.4 | 1.2 |
| United States | 1.2 | 1.0 | 1.2 | 1.0 |

a) 1980
b) 1981-82

Note: In making inter-country comparisons from this table it should be borne in mind that some Member countries fund part of their programmes from sources other than the central budget and that in the case of federal states the central budget is smaller than would have been the case if the Member country concerned was a unitary state.

Source. OECD (1985) 25 Years of Development Co-operation. A Review.

76. It is proposed that these problems can be overcome if within the framework of:-

(i) The National Development Plans (macro level planning) - which will set the goals and targets for national socio-economic development, and also set the priorities, and how resources will be mobilized and allocated and,

(ii) The sector plans for water supply and sanitation which spells out the needs to be met, the water resources requirements, the level of service to be provided, the costs, cost recovery policies etc.

The project cycle is followed in respect of each project as follows:-

(i) Project identification, which will deal with the specific situation of the community to be served, population size, health condition, economic activities, income levels, sources of water, likely places of waste disposal, whether the project will deal with rehabilitation, expansion and or the installation of completely new systems etc,

(ii) Project preparation (micro-planning). This stage will be used to go into the previous stage in detail and to establish the most appropriate and least cost technical options with which to meet the demand. This stage will also include how the management of the demand can be affected by creating an awareness for good drinking water and sanitation. It will also look at the investment and operation and maintenance costs, how cost can be recovered from the price of water or sanitation service provided. It will study the economies of the various options, the financing, and also the institution that needs to be established to implement and operate and maintain the project including the role of the beneficiaries.

(iii) Project appraisal and implementation: This stage will deal with the review of the project as prepared above, (accepted with or without modification) check whether national development and sector plan policies have all been addressed, and whether budgetary provision has been authorised, award of contract for the construction has been made, mobilization of the community to make their contribution in cash or in kind is done. It will also deal with supervision of contract performance, payments for work done, project commissioning and handing over to an identifiable institution.

(iv) Project Evaluation: This will find out whether the project has been implemented as designed, and being operated and maintained properly and whether the desired impacts intended to be made on the beneficiaries and the overall community and the national economy are being made.

## D. Project appraisal

77. It is felt that in view of the fact that the project appraisal stage offers the best opportunity to review project documents, and ensure that laid down national development and water and sanitation sector policies have all been taken into consideration in preparing the projects, it will be disucssed further in this section. The appraisal stage can reveal weaknesses which when corrected before project implementation starts could save the problems that have become associated, with implementation, operation and maintenance and their management. It must be mentioned however that project appraisal has received more attention in large urban projects when the financing resources are considerable, but not so much with rural systems. In the discussion therefore more attention will be focussed on the rural situations where considerable investment resources will be requried in the

1990s and beyond, while at the same time bearing in mind the needs of the urban situation.

78. Experience has shown that in view of the difficulty of quantifying the benefits of water supply and sanitation projects in monetary terms, and also in the seeming difficulty of arriving at projects with price of water which can be afforded by the populations, more emphasis has been placed on justifying projects on the basis of the unquantifiable socio-cultural benefits. As such there has been less resort to economic justification. While this may be so, it has encouraged a situation where scarce resource have not been optimally allocated and consequently more have been spent on projects than necessary. In a considerable number of cases even the indirect economic, and socio-cultural benefits have not been attained. In view of the magnitude of the financial resources that is required in the 1990s and beyond it is necessary to move away from this state of affairs, and attempt to apply as much as possible rigorous economic evaluations as part of the process of justifying investments in projects.

1. Multi-objective appraisal

79. In recent years the concern for sustainable water development has led to the need to ensure that the projects are also environmentally sound. This is partly taken care of if, the sanitation aspect is successfully implemented concurrently with the drinking water supply project. However, it is important that the water sources, whether ground or surface water are protected and conserved. In the semi-arid areas like in the Sudano-Sahel region where the water points are not only constructed for human use but also for animals, land degradation has been noted to occur in the vicinity of the water points due to overgrazing by the animals. It is necessary that this degradation be arrested.

80. The above points do show that the justification for projects cannot be on the economics of the project alone but that it should based on multi-objective criteria (vis technical feasibility, economic efficiency, socio-cultural acceptability and environmental soundness). This paper is on the economic aspects, so the others will not be discussed any further.

2. Economic appraisal

81. As stated earlier there is the need to follow as much as possible strict economic analysis of projects as part of the process for selecting projects for investment. The measures of economic efficiency which are usually applied are:-

(i) Net Present Worth of project,

(ii) Internal Rate of Return,

(iii) Cost Benefit Ratio,

(iv) Benefit Investment Ratio.

(a) Net Present Value (NPV)

82. This is the value of all the benefits less all the costs, both discounted at the appropriate rate to reflect the time value of capital applied to the projects. Mathematically it is expressed as follows:-

$$NPV = \sum \frac{GB}{(1+r)^n} - \sum \frac{TC}{(1+r)^n}$$

$$= \sum \frac{(GB-TC) = NB}{(1+r)^n}$$

Where GB = Gross benefits
TC = Total costs
NB = Net benefits = GB-TC
r = discount rate
n = number of years costs and benefits are discounted (normally equivalent to the project life time)

(b) Internal Rate of Return (IRR)

83. This measures a project's profitability. It is the rate at which the present value of project benefits equal the present value of project costs. Alternatively it is the rate at which the present value of net benefits is zero. Mathematically it is expressed as follows.

IRR = Discount rate which makes

$$\sum \frac{GB}{(1+r)^n} = \sum \frac{TC}{(1+r)^n}$$

$$\text{or} \quad \sum \frac{(GB-TC) = NB}{(1+r)^n} = 0$$

If the Discount Rate thus computed equals or exceeds the opportunity cost of capital, the project can be considered justified economically. There is an assumption made in this analysis that the benefits or revenues generated by the project, over time can be invested at the internal rate of return. This is not a reasonable expectation particularly if the rate arrived at is high. On the other hand if the benefits or revenues are assumed to be reinvested at the market rate of return then the rate applied to the costs equates the future value of benefits to the future value of the costs and this is called the External Rate of Return (ERR).

(c) Benefit Cost Ratio (B/C)

84. This is the net present or equivalent annual value of the benefits divided by the corresponding value of the costs.

Mathematically it is given by:-

$$B/C = \frac{\Sigma \frac{GB}{(1+r)^n}}{\Sigma \frac{TC}{(1+r)^n}}$$

A project becomes justified economically, when B/C is equal to or greater than 1.

(d) Benefit Investment Ratio (B/K)

85. This is the ratio of the total of the Net benefits of the project in years when the net benefits are positive to the net benefits of the project in a year when the net benefits are negative.

$$B/K = \frac{\Sigma \frac{NB}{(1+r)^n} \text{ in all years when NB is +ve}}{\Sigma \frac{NB}{(1+r)^n} \text{ in all years when NB is -ve.}}$$

This parameter is used in ranking different projects.

3. Financial appraisal

86. In addition to the above economic objectives which in the case of rural areas can only be used as guides, it is necessary to set financial objectives with respect to the water tariff (benefits) in such a way that by the tariff the following will be recovered:-

(i) principal and interest on loans taken to finance the projects,

(ii) operation and maintenance costs in accordance with minimum standard of service,

(iii) reserve funds to enable expansion of services to meet increased demand through internally generated funds,

(iv) provision for depreciation funds to enable replacement of plant and renewal of systems to maintain prescribed standards,

(v) earning a specified rate of return on the assets employed.

87. The investment funds from outside, may be grants or loans. Where they are grants and repayment is not required, this will tend to reduce the tariff. But in view of the scarcity of resources it may be required that a specific rate of return is earned on it. In situations where capital is a loan, governments may decide to be responsible for paying the capital and interest, this will become part of the national debt obligation to be met. The amounts involved can be passed on to the project as government equity contribution. Depending upon the situation in the

community other items of the tariffs like earning a particular rate of return on the assets employed may be temporarily or completely waived.

88. As has been stated it will be difficult at the present stage for the rural areas to meet the strict economic and financial objectives stated above. The important thing is that these should be used as tools and guides in making decisions. It is much better in a situation where limited resources are being competed for to have standards or guides for decision making rather than nothing at all.

## E. Sources and Application of Funds

89. In previous paragraphs consideration was given to the linkage of projects to National Development Planning and sector planning, and the various phases they go through including project identification, preparation, appraisal, implementation operation and maintenance to evaluation. It will be useful in the attempt to facilitate management and to lessen the financial load on the rural populations to consider the sources of funding and to clarify the most appropriate cost elements to which they should be applied.

90. Presently the sources are as follows:-

(i) Governmental - consisting of internally and externally generated funds. The external funds are those that come from multilateral and bilateral sources (see Annex) - and are given as grants or loans to governments to be used on drinking water supply and sanitation projects for rural water and sanitation projects. Usually the loans are not passed on to the communities. They are treated as part of the national debt and are paid for as such, from central government resources.

(ii) Non Governmental - consisting also of internal and external sources. The internal sources may come from organizations such as Churches, voluntary organizations or private companies. Examples of external ones are British Water Aid, World Vision International, CARE, OXFAM and Catholic Relief Services. These come in the form of technical assistance, equipment or investment funds.

(iii) Beneficiary communities - These contribute towards projects by providing free labour and materials. Where they are well off they contribute revenue by payment of water tariffs.

91. In Table 25, the sources as indicated above and the elements of cost where they have usually been applied have been indicated. It is seen that Government funding has been applied to all cost elements and this shows the primary position of governments in bearing the responsibility for providing good drinking water and sanitation facilities.

92. As shown the efforts of governments supplemented firstly by loans and grants from external multilateral sources have been applied in some cases to National Development Planning and Water Sector Planning. They have also been applied to project identification and project preparation and to implementation as far as construction is concerned. They were originally not used for community mobilization, hygiene education, heightening of the perception for good drinking water and appropriate sanitation. Of late in view of the failures that have occurred, it has been suggested that part of the external funds be used for this purpose. It would appear that while there is a good case for this, the institutions which have been established and are funded for primary health care and education (viz ministries of Health, Social Welfare and Community Development and Education) should be responsible. However because of the inadequate funding which these

ministries and departments, receive from the national budgets it will be desirable for part of the external funds to be used to assist them to carry out this important function.

**Table 25: Sources of Funds and Areas of Possible Application**

| SOURCE OF FUNDING | National/Sectoral Planning | | Project Idem./ Preparation | | Project Implementation | | O&M | Insti-tution | Monitoring Evaluation |
|---|---|---|---|---|---|---|---|---|---|
| | National Dev. Planning | Sector Planning | Proj. Idem. | Proj. Prep. | Community Mobilisation Hygiene Education Demand Management | Construction | O&M | Institution building | |
| GOV. INTERNAL | X | X | X | X | X | X | X | X | X |
| EXTERNAL | X | X | X | X | | X | | X | X |
| NON GOV. INTERNAL | | | X | X | | | | X | |
| EXTERNAL | | | X | X | | X | | X | X |
| COMMUNITY SELF-HELP | | | X | X | X | X | | | |
| REVENU | | | | | | | X | X | |

O & M = Operation and Maintenance.

93. Application of funds from external sources to meet operation and maintenance costs is an area where some difficult choices have to be made. It seems necessary that this particular item of cost should be borne by the beneficiaries as has already been shown. In view of the low levels of rural incomes and their inability to afford the tariffs in most cases, it has been suggested that for the attainment of socio-cultural benefits and the indirect economic benefits Governments should for a limited time (5-10 years) bear this cost until such time that beneficiaries are able to do so. Because of the effects of SAP, and the curtailment in government expenditures, the need to meet other social needs arising from rapid population growth, the ability of governments to pick up the cost of operation and maintenance is not foreseen to be easy. For this reason it should not be out of place to apply part of the external funds to finance the operation and maintenance costs, until the proposed 5 to 10 years when the rural incomes are expected to be strong enough to bear this cost. There is some risk involved in this approach at funding the operation and maintenance costs. If the communities become too dependent and forget their responsibility to take over, the projects are very likely to collapse as soon as the external support is withdrawn. The African region is full of experiences of this nature. Hence this approach should be applied with great circumspection. It should be tied up with projects to raise rural incomes in the agricultural and cottage industrial development fields.

94. The second source from which government's fund have been supplemented is from those of Non Governmental Organizations (local and external). Funds from these sources have not been applied to national development planning or water supply and sanitation sector planning. They have been applied to a limited extent to project identification and preparation. These agencies have realized the crucial importance of community participation and such have been quite active in

community mobilization. As such in addition to construction, they have provided assistance to heightening the perception for the need for good drinking water and suitable sanitation facilities through public and hygiene education. Some tend to want to work alone, but they have realized the need to support the established institutions to get work done. They have also realized that there is need to provide support for operation and maintenance for schemes to succeed. Their original plans did not take account of this cost. To overcome the problem some of them have been assisting to set up community level institutions to be responsible for operation and maintenance.

95. The third source from which resources have come to is from the beneficiary communities. Their contributions have firstly been in kind, in the form of labour and materials for construction. Secondly some have contributed their time for operation and maintenance activities. In the better off communities they have paid water tariffs and thereby made it possible for revenues to be generated and applied to operation and maintenance of systems.

96. On the application of funds for the building and strengthening of institutional capability to take over operation and maintenance of projects, this was not perceived as a high priority from the beginning, but since 1983, this has been recognised as a crucial area and as such both governmental and non-governmental funds from internal and external sources are now being applied to institutional building and strengthening.

## F. Tarrifs and cost recovery

97. It has been shown that the national budgets of the African countries cannot support the investment and operation and maintenance costs of the IDWSSD beyond the present levels. There is, therefore, the need to mobilize additional resources to step up the pace of implementation by reviewing the cost recovery policies.

98. At the heart of the problem is firstly the task of mobilizing and allocating scare resources to:

(i) install systems and facilities and

(ii) operate and maintain them with the objective of producing and delivering drinking water of adequate quantity and quality on a reliable basis, and to manage the wastes resulting from the use of water supplied for human and household activities in such a manner that the wastes do not contaminate or pollute the water sources (either surface or ground water).

Secondly is the task of fixing a tarrif (price) for the water delivered or the sanitation service provided in such a way that the installation (capital) and operation and maintenance costs can be recovered. This will ensure that future investments in and delivery of water and sanitation services will be on a sustainable basis. However, it seems that in view of the problems that are being faced by governments in cost recovery a few issues should be reviewed.

1. The needs and demand for water supply and sanitation

99. One of the basic issues that needs review is the concept of needs and demands, for water supply and sanitation services, and the bodies and communities from whose perspective these needs and demands are perceived.

100. It is true to say that there are two perceptions of demand. One is from the point of view of the policy and decision makers at the top who are external to the rural environment. The other is that of the consumers or beneficiaries at the bottom, who actually live in the rural environment.

101. Those external to the rural environment see the need for good drinking water and sanitation because firstly it is a basic need for the proper physiological functioning of the human body. Secondly it can eliminate the water borne, water related and water associated diseases (eg. dysentery, diarrhoea, cholera, bilharzia, guinea worm, schistosomiasis, onchocerciasis, malaria) that afflict the majority of the populations in the African region. Thirdly the elimination or abatement of these diseases can lead to socio-cultural benefits in terms of improved health and quality of life. It will also lead to increased productivity and save them time which can be devoted to the pursuit of other economic activities.

102. For those who live in the rural environment it can be said that the perception for water firstly as a basic need for the survival of the physical body is very high. Secondly, there is a good perception that the physical and chemical quality of water must be acceptable and tolerated by the users. Thus saline water, or water containing excess concentrations of iron which makes it taste metallic or stain food and clothes are rejected. Thirdly, there is a high perception of the need for water to be closely available nearby all the time in sufficient quantity. On the other hand it can be said that the perception that water can be a transmitter of diseases and must be bacteriologically safe to be taken is not high. Also the perception that household wastes including excreta should be disposed of in a sanitary manner so as not to introduce disease pathogens into waterbodies and humans is equally not high.

103. It follows from the above that for cost recovery policies to be successfully implemented, there must be more concern about demand which really expresses the desire of the communities to have water and sanitation facilities. In fact needs and demand should be coincident and in that case those outside and those within the rural environment will be talking about the same issues. The notion of demand for a commodity or service goes with a willingness to make a sacrifice to have it.

104. Hence perception of the consumers/beneficiaries for good drinking water as a good, and sanitation facilities as a service must be heightened so that a demand is created. To heighten this perception the ignorance about the effects of non-bacteriological quality of water and the ignorance about the effects of insanitary disposal of household wastes including excreta must be removed. This underlies the extreme importance of hygiene education which must be taught at both formal and informal levels by various education delivery systems appropriate to the different target groups.

105. Looking at the problem from a purely economic standpoint, good drinking water is the economic good and suitable sanitation facility a service to be supplied to consumers. Within the economic context demand must be manifested to warrant any investment in the production of the good and service. Also the prices at which the good and service are provided should be such that the investment costs, and the operation and maintenance costs will be recovered. As already stated the price (tariff) must include margins that will enable interest on investment capital to be paid, the expansion of the system to meet increased demand, and also the replacement of the systems at the end of their useful lives. In addition to the willingness of the consumers/beneficiaries to pay, they must have the ability to pay for the good and service. They should be able to afford the prices (tariffs).

## 2. Water and Sanitation costs and tarrifs

106. As indicated the cost of producing and delivery of a unit quantity of water consists of investment and operation and maintenance costs. But the price or tarrif charged to consumers must in addition include, interest on capital, depreciation, expansion and return on assets. This can be represented by:-

$$\text{Cost} = \text{Cap} + \text{OM} \quad \ldots\ldots(1)$$

$$\text{Tarrif} = \text{Cap} + \text{OM} + \text{Int} + \text{Dept.} + \text{Exp.} + \text{Ra} \quad \ldots\ldots(2)$$

Where
- Cap = Capital investment
- OM = Operation and Maintenance
- Int. = Interest
- Dept. = Depreciation on assets
- Exp. = Cost of future expansion
- Ra. = Return on assets

### Marginal and Average costing and pricing

107. Each new system that is built can be costed and the tarrif set up as represented above. This will be a case of marginal costing and pricing. On the other hand the additional cost incurred in putting up the new system with a stated design capacity can be added to the systems under the jurisdiction of a water corporation and the average cost per unit quantity worked out. This will be a case for average costing and pricing.

108. The marginal pricing approach will be suitable for individual systems particularly large urban ones. It will also be found applicable to the system in the many isolated, widely scattered and sparsely populated rural settlements. It will of course lead to having different tarrifs in various parts of a country. The equity of such a tarrif policy must be weighed against its political acceptability.

109. The average tarrif approach enables firstly the same tarrif to be applied in all parts of the country. Secondly it allows cross subsidies within the sector to be made particularly in cases where a single organisation has been established to develop and operate the systems. This way the systems (particularly the urban ones) which are able to make a profit are able to subsidise those systems (particularly the rural ones) which cannot cover their costs. It also removes the burden of providing subsidies from the shoulders of central governments.

110. It must be pointed out however that with the present effort to make rural communities entirely responsible for the water supply and sanitation services as separate entities the marginal costing and tarrif approach will be the more appropriate. It is therefore evident that the application of either marginal or average tarrif policy is closely linked with the kind of institutions that have been established for the provision of water and sanitation serives.

3. Ability to pay for water and sanitation tarrifs

111. It has been stated that if the perception for the demand of good drinking water and adequate sanitation facilities could be properly heightened then a market would be created in which the consumers would demand to have the good and service and, therefore, be willing to pay a price for them. This is the first step towards recovering the costs of investment and operation and maintenance.

112. However the willingness to pay does not necessarily go with the ability to pay particularly in the rural areas. The inability of the rural people to pay for the cost of water and sanitation services is due to the very low levels of rural incomes in the African region, compared with the high cost of water which has been brought about by inflation and devaluation rates higher than the rates at which incomes have risen if at all. This high cost of goods and services relative to incomes is a factor which partly accounts for the migration of rural dwellers to the urban areas which presently is accelerating the rate of urbanization in the region as shown in Table 2. It has been suggested by the World Bank that the cost of water should not exceed 5-6 percent of the incomes of the poorest household. 12/

4. Cost Recovery

113. As indicated earlier one of the causes of the failures of rural water and sanitation systems was the lack of provision to cover operation and maintenance costs. This meant that investments were made to install the systems but they could not be operated and maintained to deliver service. The scarce resources thus allocated and utilised yield no returns. The rural communities suffered as they could not generate operation and maintenance revenue because individual household incomes are low to afford the tarrifs. Such a situation offends society's sense of equity as the urban areas depend upon their relative prosperity on rural effort. Also it is clear that if for lack of those basic facilities epidemics should break out in the rural areas they may be carried to other areas including the urban ones.

114. As stated the problem of cost recovery in the rural areas hinges on the ability to pay economic tarrifs as presented in Equation (2). This depends on rural incomes. Hence it is to be expected that as these incomes improve with time they will be able to pay progressively higher tarrifs until they are eventually able to pay the economic rates. As such the policy on Cost Recovery should be one that should be achieved fully overtime. Hence in the first few years of a project's life it has to be accepted that net benefits will be negative. During this period efforts should be made to improve rural incomes by linking the drinking water and sanitation projects with rural development particularly in agriculture and cottage industries. As the incomes improve the tarrifs should be progressively raised until firstly they break even with costs. There after positive benefits will be derived. The time over which this can be achieved depends upon the rural environment in each country but it may be necessary to do this within 5 to 10 years.

115. With the above as target the question of Cost Recovery may be approached as follows based upon Equation (2).

(i) Initially a community should be assessed for its ability to pay the economic tariff. If it has the ability then it should be called upon to pay accordingly.

(ii) If (i) is not possible, then it should be assessed for its ability to pay at least the operation and maintenance cost. If it has the ability then the tariff should accordingly be set at this level.

Thereafter the tariff should be progressively adjusted upwards till the economic rate can be afforded with the improvement in the levels of income.

(iii) If the Operation and Maintenance cost cannot be afforded as in (ii), then the community should be assessed for what it can currently afford and the tariff set accordingly. The difference between the assessed tariff and the operation and maintenance cost should be treated as subsidy to be paid by government or by cross subsidy in the cases where national water corporations have responsibility for both urban and rural water supply and they are expected overall to break even on costs and revenue. In this case the assessed tariff should be progressively increased with time and with improving income levels till the operation and maintenance costs can be covered. Thereafter, further increases should be applied till the full economic tariff can be afforded.

(iv) In cases where the above is even not possible and beneficiaries are not able initially to pay at any tariff level, the full burden of operation and maintenance will fall on government as subsidy or a corporation with national responsibility for both urban and rural water supply as indicated at (iii). In this case the beneficiaries will make no contribution initially to the cost of providing them with water and sanitation. This situation will satisfy those who entertain the notion that water is a free good provided by nature and as such should not be paid for. This is an illusory notion, because the burden is only shifted from the beneficiaries to other taxpayers. Of course as proposed in (ii) and (iii) tariffs should be increased with time till first the operation and maintenance cost can be recovered and secondly the economic tariff can be afforded.

# VI CONCLUSIONS

The following conclusions are drawn:-

116. The decade has seen some progress made to provide more of the African populations with good drinking water and suitable sanitation facilities. By the end of 1988 an additional 40 and 52 million people had been supplied with good drinking water and suitable sanitation facilities respectively in the urban areas. These brought the urban coverages for water supply and sanitation from 66% and 54% in 1981 to 77% and 79% respectively in 1988. For the rural areas an additional 87 and 1 million people were supplied with drinking water and suitable sanitation facilities respectively. These brought the coverages of rural water supply and sanitation from 22% and 20% in 1981 to 26% and 17% respectively in 1988.

117. The current rate of progress is such that the objectives of the decade will not be attained either by 1990 or 2000. The situation is worse in the rural areas where for both water supply and more particularly in the area of sanitation the rate of progress is just about the rate of growth of population and in some cases less.

118. The investment needs prepared in 1980 to achieve the objectives of the IDWSSD by 1990 were not realistically estimated as they did not take into account the national trends in the growth of investment funds from both internal and external sources over the previous decade 1971 to 1980. Hence, the absorptive capacities to undertake sector planning, project identification and preparation, project implementation, operation and maintenance etc. were much overestimated.

119. In the rural areas, investments have been made more on socio-cultural considerations, and less on economic ones. Cost recovery has consequently been shifted from the direct beneficiaries to the general tax payer. Because of the economic situation, he cannot be taxed any further to cover the rising costs of operation and maintenance.

120. As a result of the above most water supply systems have to survive on dwindling government subsidies for operation and maintenance funds. Present levels of government revenue cannot accommodate the rising levels of operation and maintenance costs. Lack of adequate funds has meant the collapse of systems, the loss of the use of scarce resources, and unattainment of the socio-cultural benefits.

121. The progress achieved in the 1980s has been seriously constrained by the state of the African economy over the 1981-88 period (viz high rate of population growth, high oil prices, falling prices of primary commodities on the world market, rising imports, inflation, balance of payment difficulties, rising debt burdens, drought and environmental degradation).

122. The Structural Adjustment Programmes that countries have had to implement to solve the ills of their economies have led to reduction in investment funds and operation and maintenance subsidies due to the adjustment packages to reduce government expenditure in order to correct both the external and internal balance of payments difficulties.

123. In general financial flows from the multilateral (UN system and others) sources to the sector increased over the 1981 to 1983 period, but have been showing a downward trend since 1984. The flow of resources from the bilaterals particularly the Development Assistance Countries (DAC) shows that there was a slight increase in the ratio of aid to their GNP from 0.34 to 0.36 over the 15 years period, 1970-1984. On the other hand the percentage of aid to central government expenditure from these countries over the same period has remained almost unchanged. About 6.7% of the aid from the DAC to developing countries has been devoted to water supply and sanitation.

124. Population estimates by various agencies viz national governments, ECA, WHO and the UN for countries in the region should be reconciled. At the country level policies should be devised to ensure that the progress is not outstripped by higher rates of population growth.

125. Countries should undertake more accurate estimates of the population coverage for drinking water and sanitation as a basis of assessing the magnitude of the work outstanding to cover in the 1990s and beyond.

126. Countries need to revise and or update their sector plans for the 1990s. To this end they should among other things:-

(a) Review their internal and external investment trends over the 1980s as a basis for establishing their absorptive capacities.

(b) Assess the external funds that have been firmly committed to projects which will spill into the 1990s regarding rehabilitation, expansion, completion of on-going projects and construction of new projects.

(c) Have the national planning authorities indicate the percentage of total investment that will be allocated to the water supply and sanitation sector, in the development plan periods during the 1990s. In this exercise the national planning authorities should specify the terms and conditions under which external funds will be accepted, the priorities that they wish to give to rural as against urban systems, the mobilisation of internal funds to make investments in the sector sustainable.

(d) Revise and update sector plans which will be included in the development plan period on the basis of the exercise at a, b and c.

127. To ensure that scare resources are used efficiently, projects in the rural areas should in addition to the socio- cultural criteria, be justified more and more on economic and financial criteria. The economic and financial criteria should be used and be applied more rigorously as guides from the beginning as conditions in the rural areas improve.

128. Sector Plans should be properly linked with national development plans at the macro-level and also to individual projects at the micro-level. To this end the project cycle should be followed and project appraisal should be insisted upon equally for rural investments before approval is given for implementation. This is to ensure that national development and sector policies and strategies have been properly taken into account in project identification and preparation, before approval is given for project implementation to start.

129. Sustainability of investment in the sector should be given highest priority. To this end each country should put in place sound cost recovery policies. The immediate objective is to introduce tarrifs that will recover the costs of operation and maintenance of both urban and rural systems. The ultimate objective (to be

achieved over a period of 5 to 10 years) is to progressively increase the tarrifs over time, till costs can fully be recovered in terms of principal and interest on loans, operation and maintenance, expansion of services on a self generated basis, depreciation of plant and assets to enable replacement and renewal system at the end of their useful life, and a reasonable return on the assets employed.

130. In the rural areas the willingness to pay should be heightened by making sufficient funds available to increase the perception for the need and demand for good drinking water and satisfactory sanitation facilities. The ability to pay water tarrifs should also be increased by linking water and sanitation projects to income generating activities in the fields of agriculture and cottage industries.

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## List of Bilateral (DAC) & Multilateral agencies

| DAC countries | Multilateral |
|---|---|
| Australia | AF.D.F. |
| Austria | AF.D.B. |
| Belgium | AS.D.B. |
| Canada | E.E.C |
| Denmark | IBRD |
| Finland | IDA |
| France | I.D.B. |
| Germany Fed. Rep. | IFAD |
| Ireland | IMF Trust Fund |
| Italy | UN Agencies |
| Japan | UNDP |
| Netherlands | UNTA |
| New Zealand | UNICEF |
| Norway | UNRWA |
| Sweden | WFP |
| Switzerland | UNHCR |
| United Kingdom | |
| United States | |